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- **Extensive tutorials:** modelling and animation
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- **Pump Action:** how our cover star was created

3D mania!

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Industry pros reveal what you need to know

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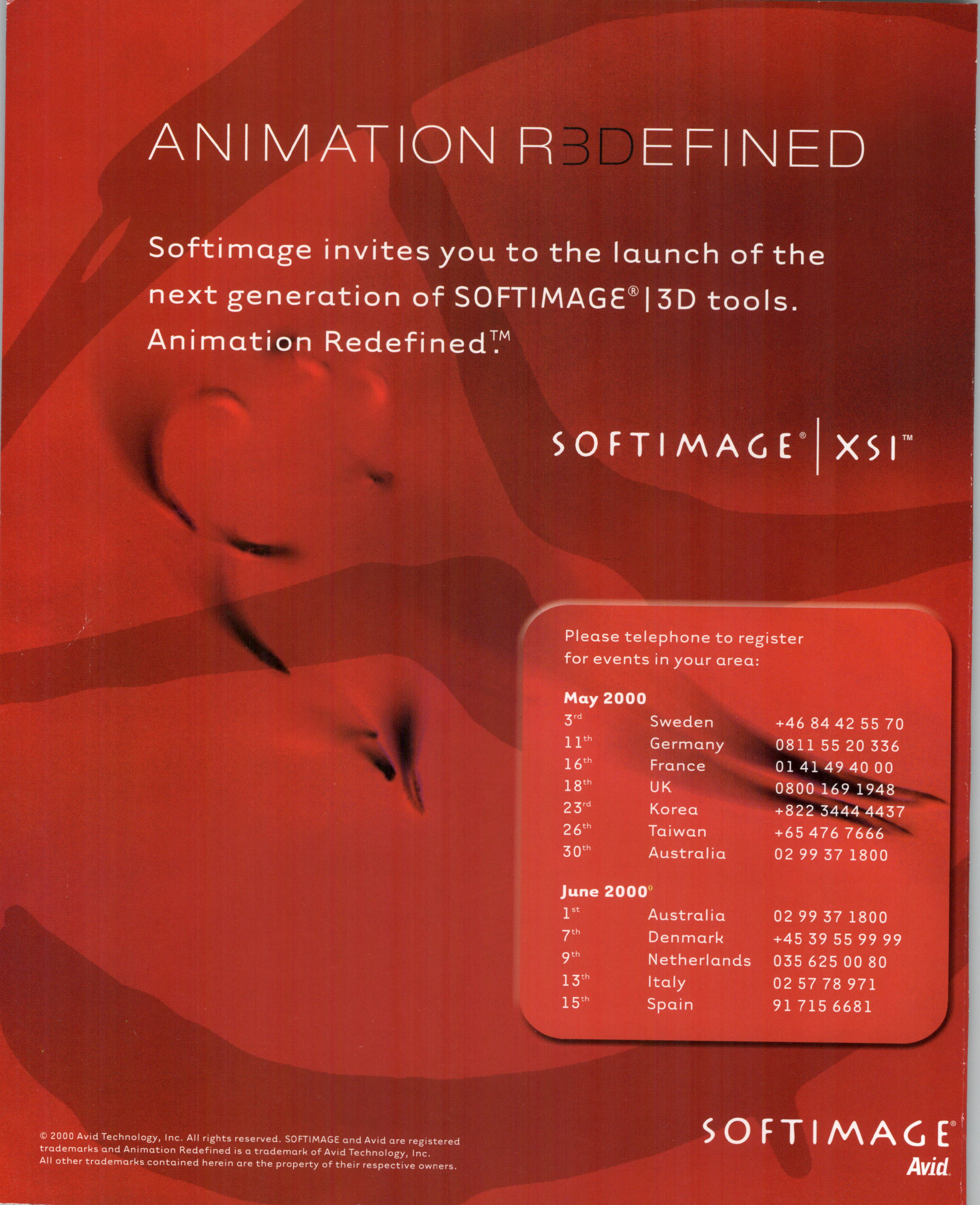

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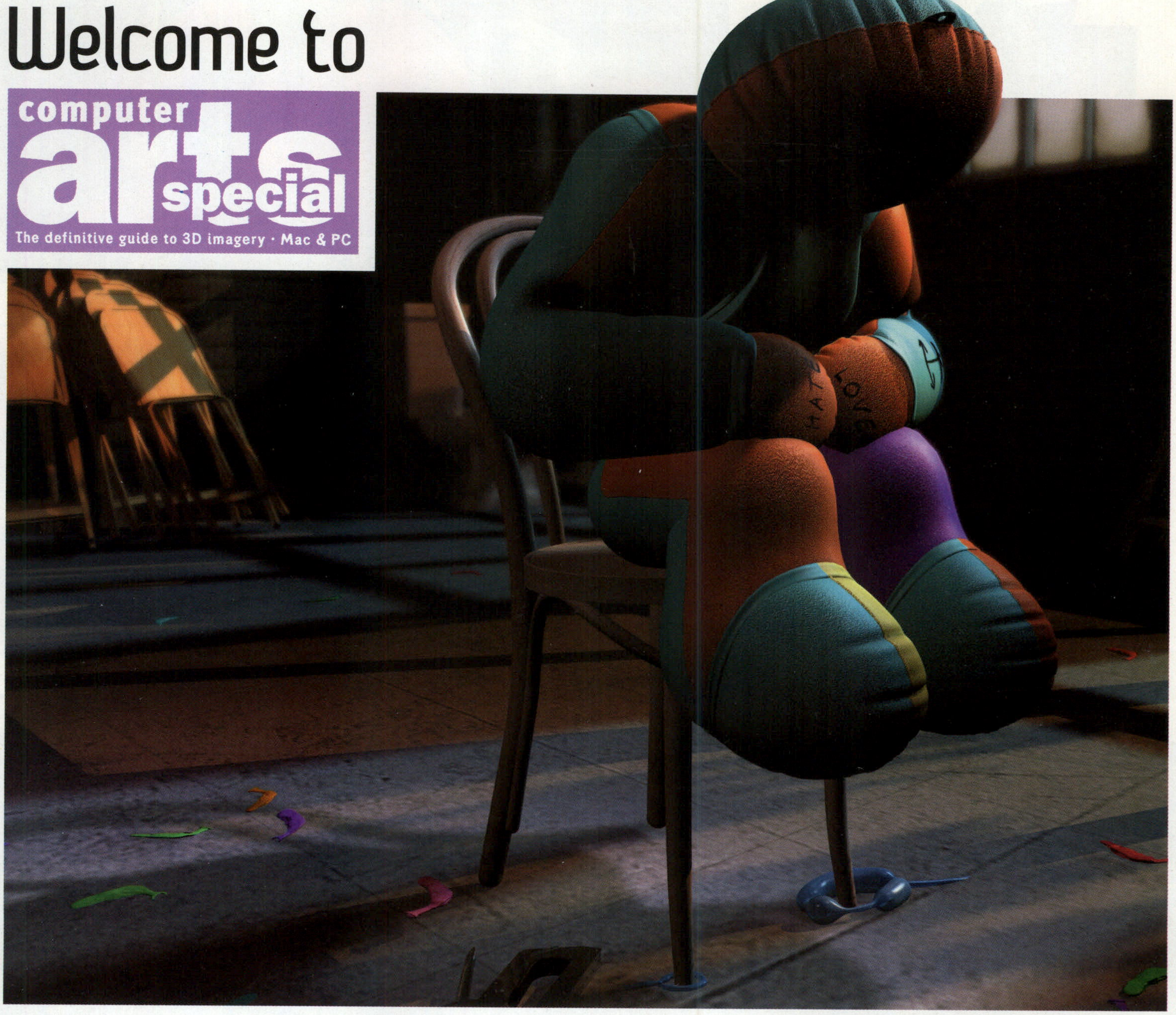

Illustration: Phil McNally Telephone: 020 7708 5091

Not so very long ago the world of 3D computer graphics was a confusing and expensive place. You would need hardware costing many thousands of pounds to create even the simplest 3D scene. You would need to grapple with software written for mathematicians and programmers, with no interface to speak of. And you would have to wait hours to render just about anything.

Thankfully the 3D world has changed drastically for the better. Nowadays a £1000 Mac or a PC running a £400 piece of software is much more powerful than the most expensive SGI kit from ten years ago.

And you don't have to be a rocket scientist to use it. You need only look at Phil McNally's astounding animation *Pump Action* (featured above) to see what's possible. Phil isn't a professional animator, and he doesn't own masses of kit. He simply has flair, great ideas and the determination to see a project through to the end.

In this 3D Special we'll show you a small part of just what is possible with today's 3D software. We've got pages of tips and tutorials, resources, expert advice from the professionals, and a thorough look at how to get a job in the 3D industry.

But most of all we've got inspiration, in the form of astounding images and animations from both pros and amateurs alike. There's no substitute for talent, of course, but there's really no reason why you can't create similarly amazing pieces – or even better.

So what are you waiting for? Get in there and start rendering! ca>s

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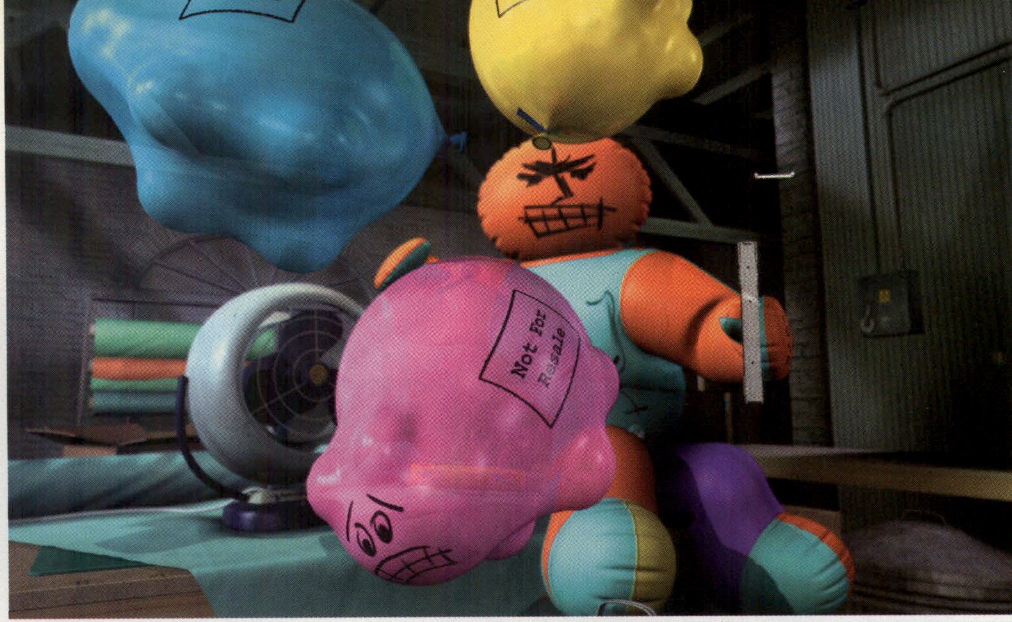

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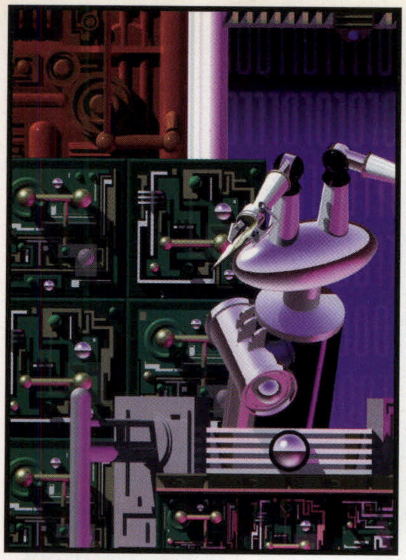

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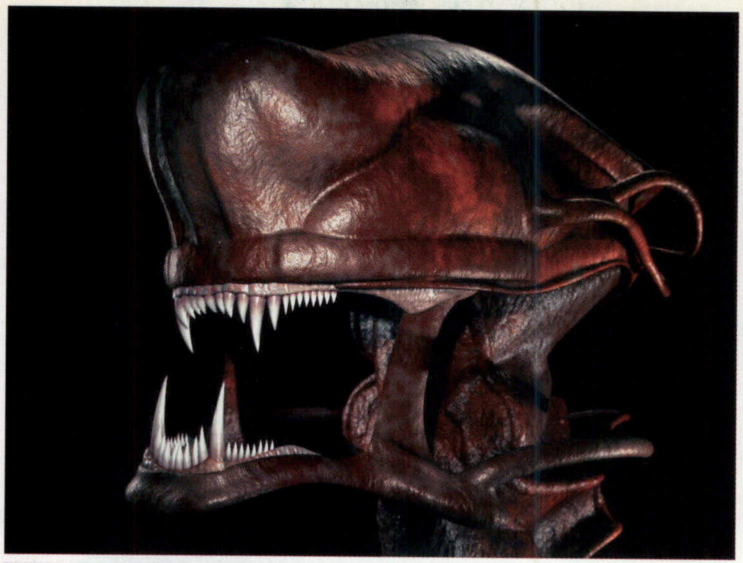

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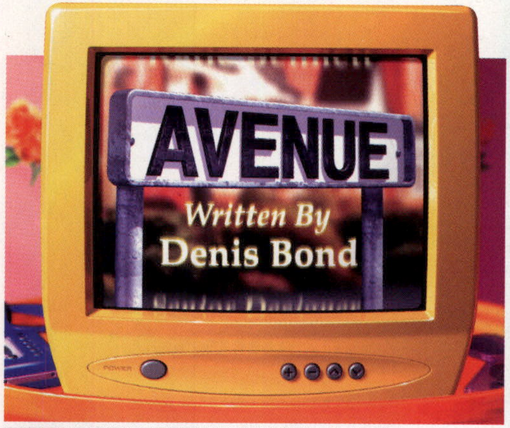

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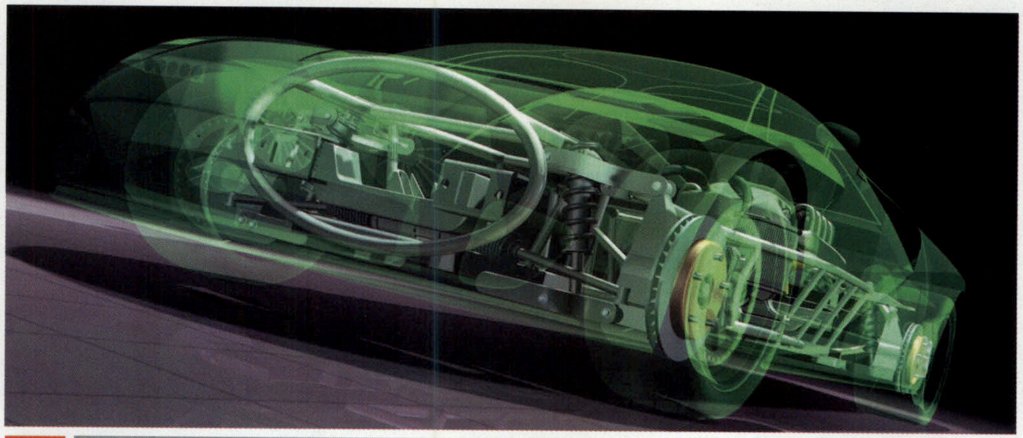

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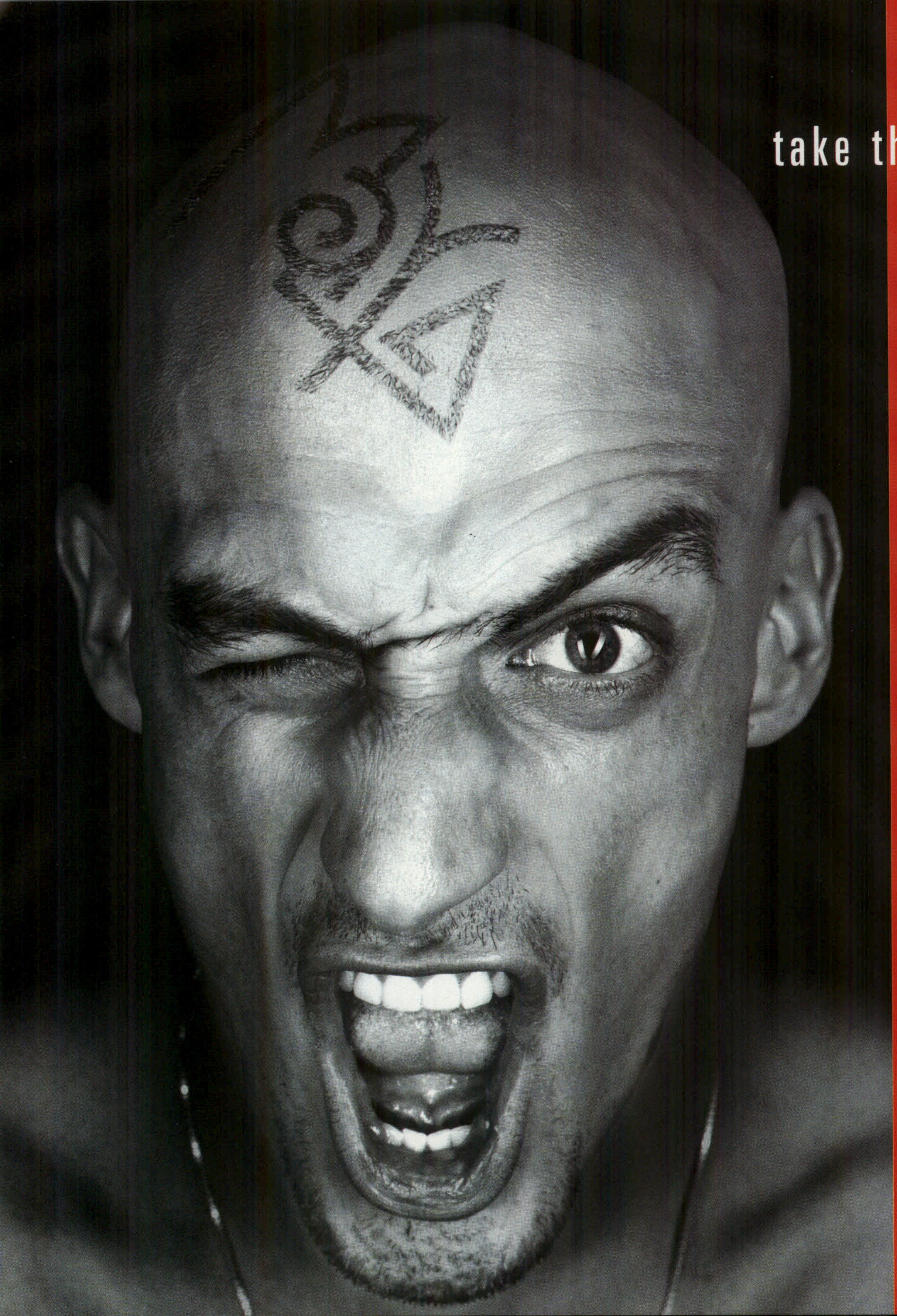

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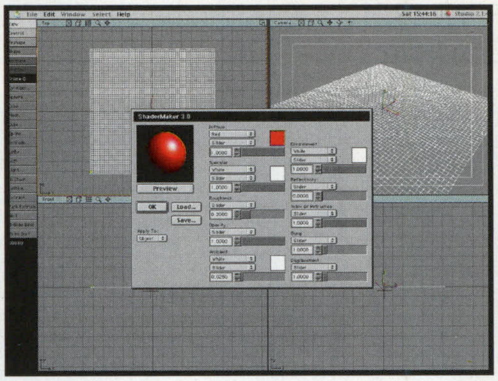
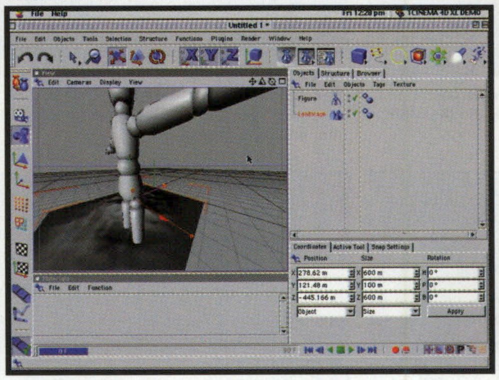
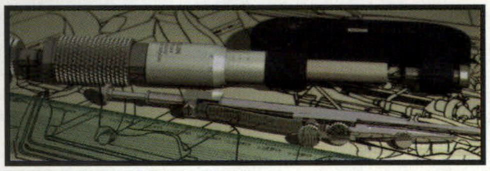


Pump Action movies

Cinema 4D 6 XL



Exposure



Websites

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PiXELS3D|2.1.4 full (Mac)

Pixel Studios' fantastic 3D package just gets better and better. Try out this complete, unlimited version and see for yourself

Cinema 4D 6 XL demo (dual)

The incredibly versatile modelling and animation tool (used to make *Pump Action*, p26) enters its sixth incarnation. Try it here!

trueSpace 4 demo (PC)

Easy to use but surprisingly powerful package from Caligari

solidThinking 3.5 demo (PC)

Fully-featured high-end modeller and renderer. Gaining ground fast – and you'll know why when you try it

Bryce 4 demo (dual)

The legendary landscape creation program that's grown into a whole lot more

Canoma demo (dual)

Innovative package that enables you to make complete 3D scenes from photographs

PiXELS3D|3.6.1 demo (Mac)

Demo of the very latest version

form•z 3.5 demo (dual)

Exemplary modelling package used by many pros day in and day out

Pump Action movies

Trailer and exclusive 'making of' segments from Phil McNally's forthcoming video. See page 26 for more details

Websites

Direct links to the latest batch of recommended sites

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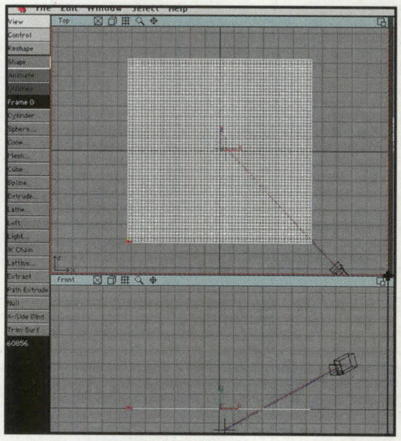
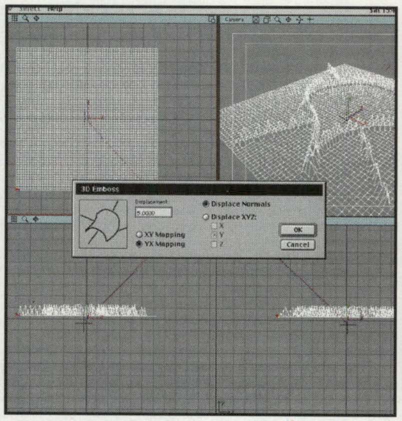
For full listings, contacts and further details, see the inside of your CD booklet or [w] www.computerarts.co.uk

PiXELS3D|2.1.4's ShaderMaker

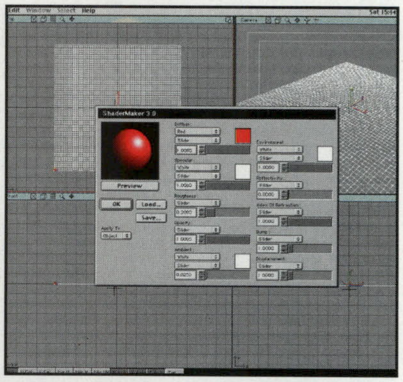
Here's how to render a landscape in *PiXELS3D|2.1.4*, using the ShaderMaker… you can find the full package for free on the Coverdisc.



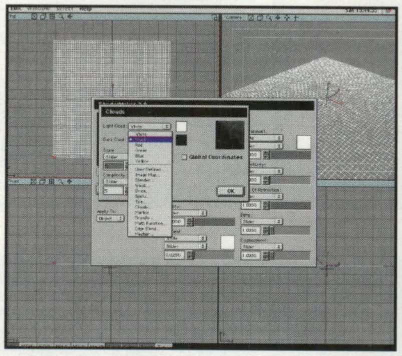
1 Use Shape>Mesh to create a Mesh object, and set the U and V divisions to 60, and the width and length to 50.



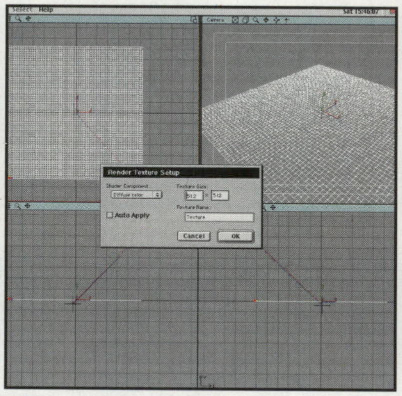
2 Use the Reshape>3D Emboss tool to create the terrain for a landscape. Click OK, and a default imagemap is used to generate numerous mounds in your mesh.



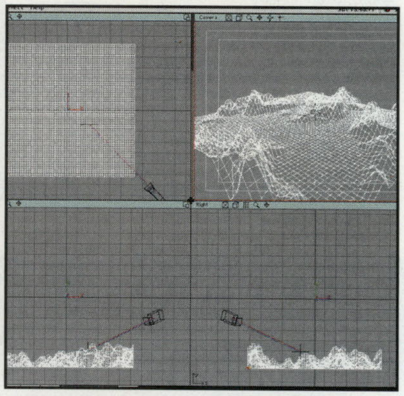
3 Undo the emboss, because we'll use *PiXELS'* powerful ShaderMaker to create our own image map. Choose Window>ShaderMaker to launch the Shader window. It looks very complex, probably because it is, but we're only concerned with the Diffuse and Specular values for now.



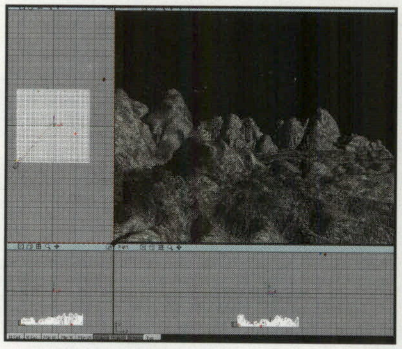
4 Reduce the Specular slider to zero and click the Preview button to see the result. Click the Diffuse drop-down to see the list of shader functions. Change it from Red to Clouds, and then change the Dark Cloud colour from blue to black in the Clouds shader dialog that appears. Set both the Scale and Complexity to 5, then click OK.



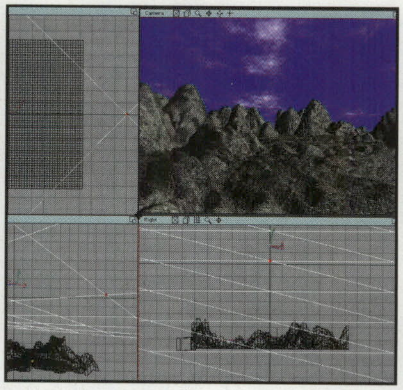
5 From the Utilities Tool menu, choose Render Tex, accept the defaults and click OK. *PiXELS* prompts you to navigate to a location to save the texture on your hard disk, and then render the texture as a Pict file.



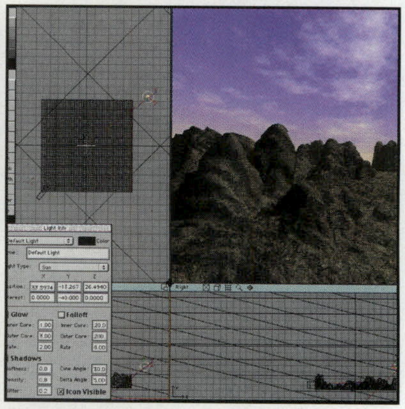
6 Click the 3D Emboss tool again, but this time click the icon on the left. Navigate to your Clouds texture and click Open. Set the value to -5 and click OK. You should have a landscape object like the one above.



7 From within the ShaderMaker, create a rough, rocky texture. The look is up to you, but we used Clouds in the Diffuse channel, the Granite shader in the Specular and Roughness channels, the FBM shader in the Bump channel and Wood in the Displace channel. Each of these shaders has lots of controls – it's best to just play around to see how it all works.



8 Add another mesh set to 10x10 divisions, and 500 units in size. Then rotate it so that one edge meets the horizon from the camera's viewpoint. Give the mesh a cloud shader in its Luminosity channel, and set its diffuse and specular attributes to zero.



9 Finally, enable Fog in the Render preferences. Set the Near value to 0, the far value to 200 and the colour to a pale orange. The final image looks like this. Notice that the fog has mixed with the sky to produce a nice graduated horizon.

Our users don't always have
the right version...

Even as you read this, someone is reporting a company using cracked copies of 3D Studio MAX. That company could end up paying a hefty fine as well as suffering the embarrassment of being caught. Could that be your company?

On the other hand, if you're one of over 100,000 legal MAX users and you're tired of being in competition with companies who don't buy their software, call the BSA on 0800 510510. There is a reward up to £5000 for information leading to a successful settlement.

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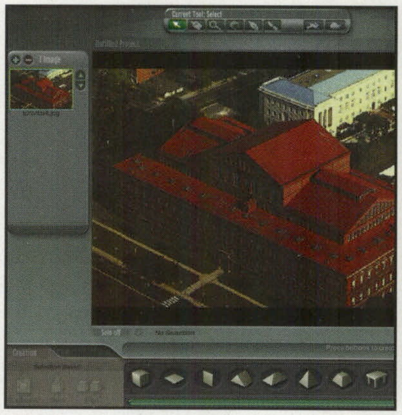
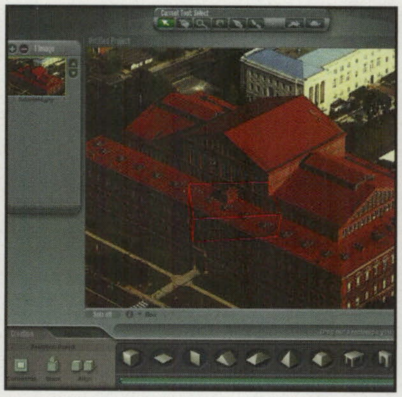
Canoma 1.0

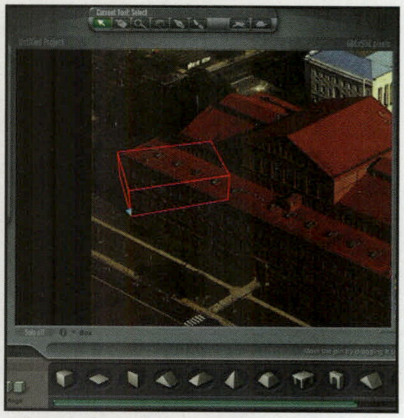
Canoma is the incredible tool that enables you to create a 3D scene from a flat image. Here's how to do it with a sample file supplied with the demo on the Coverdisc…



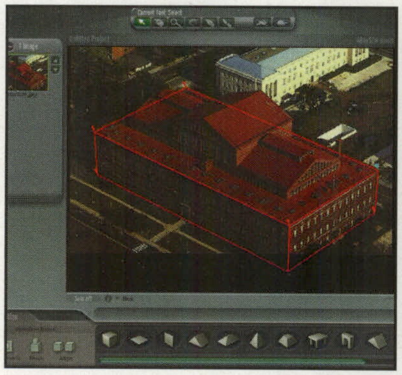
1 Before you can do anything in *Canoma,* you must import the image you want to use. Click the Plus sign on the 2D Image palette and navigate to Tutorial4.jpg on the CD.



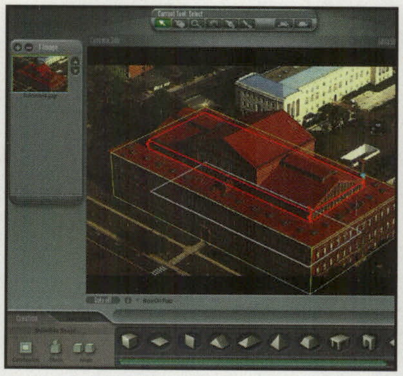
2 With the image displayed in the workspace, you can begin to add geometry to match the objects in the image. Click the Creation tab below and select the Box object. A box is placed in your scene.



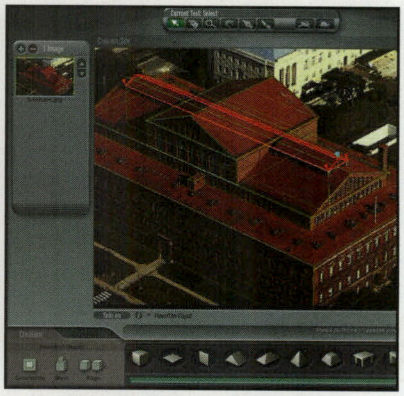
3 Click the bottom-left corner of the box and drag it to the corresponding corner of the building. Hold the spacebar down to pan around the image if you need to.



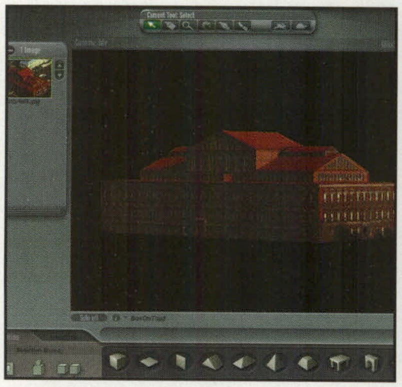
4 Now begin dragging the other corners of the box to line them up with the building. At first the box will look totally wrong, but as you pin more and more corners you'll see the shapes line up. Don't try to pin the bottom-front-right corner, as it's not visible.



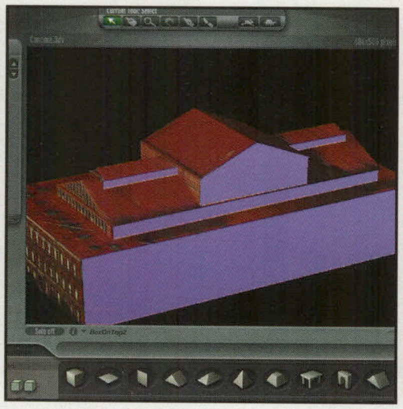
5 Click the box to select it (it turns red), make sure the Stack option is active in the Creation tab, then click the Box tool again. This time the box is created resting on top of the first box (notice the shadow). Pin the corners of the new box to the first story of the roof, as you did before.



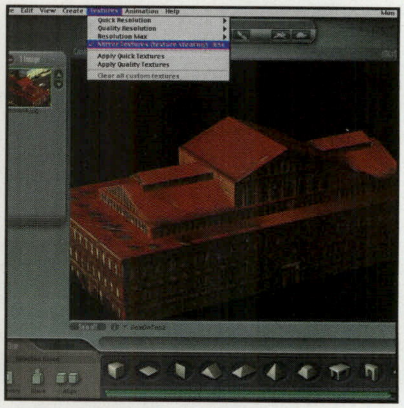
6 Continue to add geometry and pin it to the corresponding object corners in the image. As your scene gets busier, you can use the Solo button to dim deselected objects, so you can concentrate on aligning the current object.



7 Now for the fun bit. Click the Quality Apply button (looks like a Tortoise) to render the image onto the geometry you've created. It may take a few moments, but then you can use the track ball to rotate the view, and see your image from a different angle.



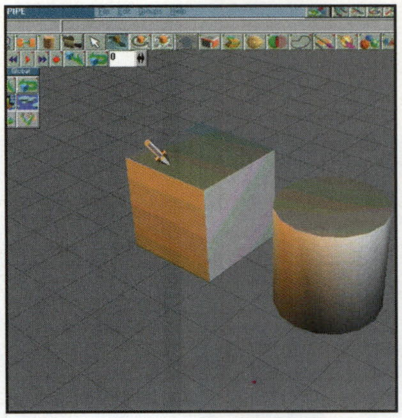
8 You'll also be able to notice where you need to add extra geometry, but the biggest problem is if you rotate around the back. Because the image is 'projected' from one direction, the hidden sides of the building have no textures.



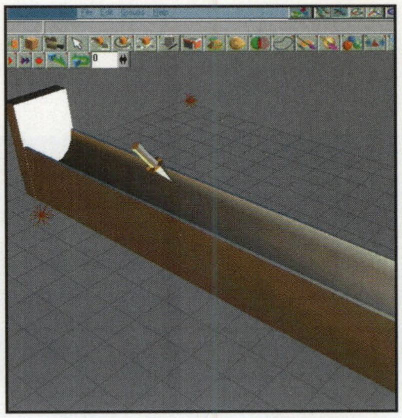
9 *Canoma* enables you to pinch textures from one side and map them to the other. Enable Mirror Textures from the Texture menu, and your building is complete. Now try it with one of your own photos…

trueSpace and simulation

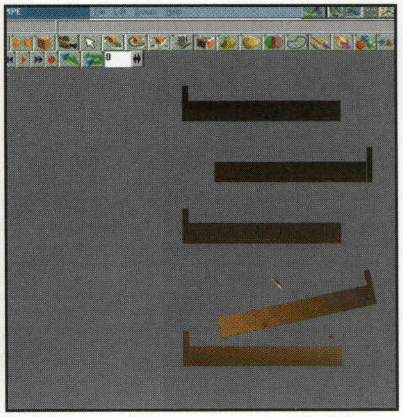
Although it's 'only' a low-end program, *trueSpace* includes some hefty dynamics features. Try them out using the demo of version 4 on the Coverdisc.



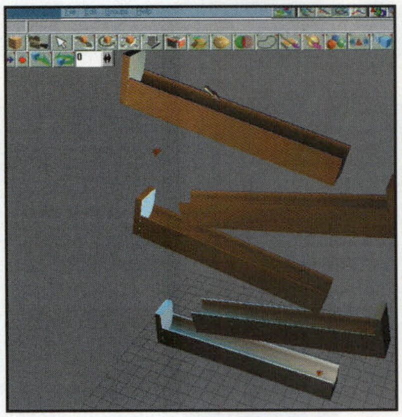
1 This system uses gravity as its power source. Here, we'll make a marble run. Start with two simple primitives – a cube and a cylinder. With these we're going to make a gutter.



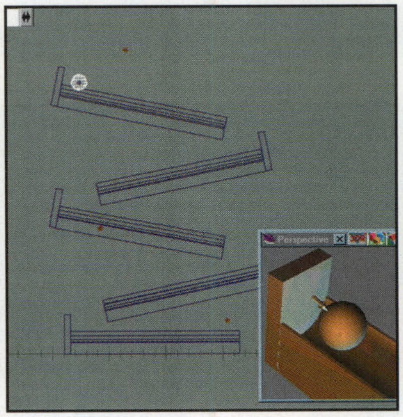
2 After sizing and positioning the objects, the cylinder is Booleaned from the cube. Another cube is added to this to make an end-stop. You can texture this later – right now we need five copies.



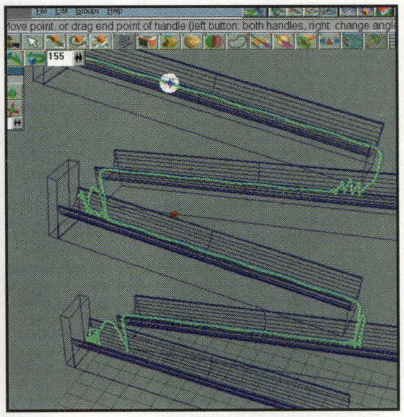
3 The gutter object is copied and rotated into a general position, using the grid. Then each one needs rotating without the grid on. In the SE version the grid rotate is locked at 45 degrees.



4 You now need to create a sphere and position it at the top. Then set the physical attributes to IRON using the Local Physical panel. The gutter doesn't need any attributes to obstruct the marble.



5 Run the simulation. The marble will now attempt to run down the slopes. If your first attempt ends in disaster, don't worry – so did ours. Set the calculations per frame to 8 and try again.



love point, or drag end point of handle (left button: both handles, right: change angl

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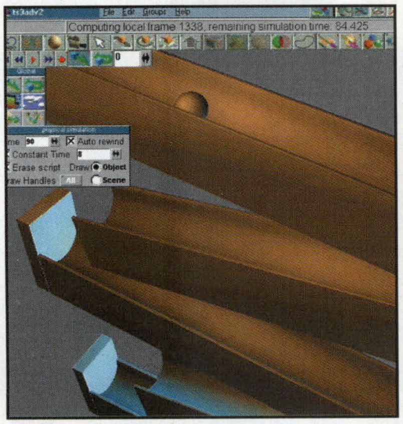
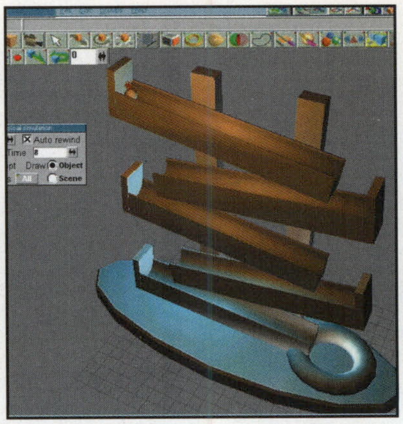
6 Making more calculations slows down the process, but makes for better movement. Here the path displays all the action. If you still have some weird results try Smooth Quad dividing the objects.



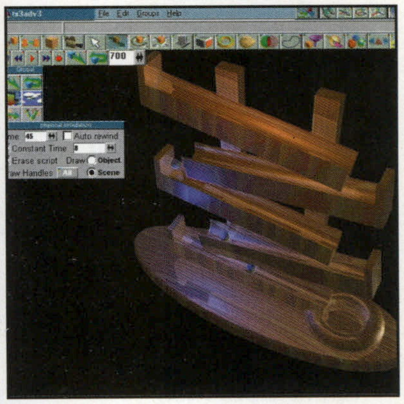
Computing local frame 1338, remaining simulation time: 84.425

me 90 ☒ Auto rewind
Constant Time 8
Erase script Draw ● Object
aw Handles All ○ Scene

7 The trick to making the marble run is not to make it run too fast, as it will jump out of the track. Interestingly, this is exactly the same problem you have in making a real marble run.

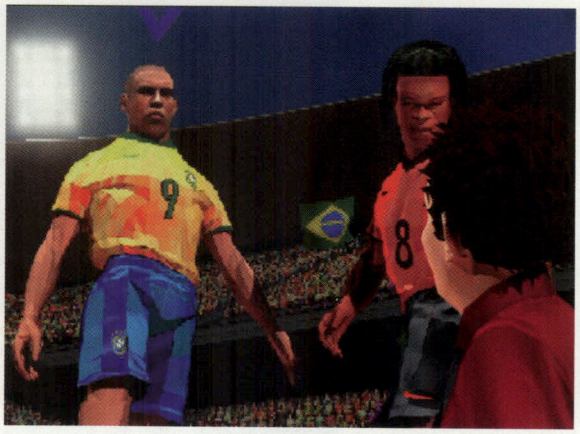


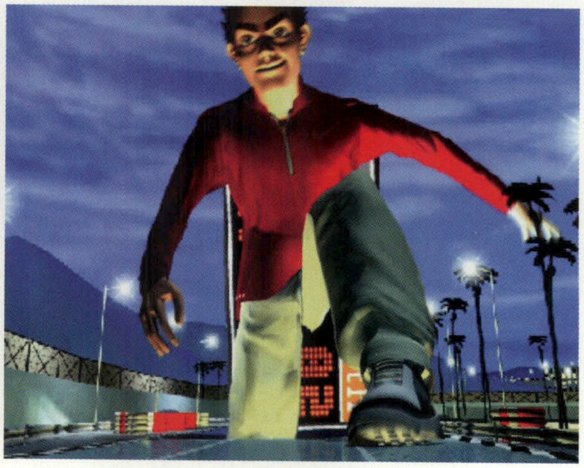
8 After tinkering with the parts to get the exact perfect run, some additional parts have been added to make the object look right. After that the object was textured using some in-built textures.



9 The marble was copied twice and the action length set to 45 seconds. This produced over 1300 frames of animation with very little effort. Once the simulation is run you can edit the results as a path.

1. Buf also contributed to an animation last year, where the director was aiming for the look of animated puppets. *Kiss Cool* is the story of a little guy called Schmurk, who meets a taller guy named Blemish sitting on the pavement. Modelling and animation, as well as set rendering, were all done by Buf. "We started the animation in *Softimage*, also used *mental ray*, and then brought it into our in-house software to refine it and give it the Buf touch." Production by Partizan Midi Minuit. Distibution by Virgin.





2. The modelling on the video game-themed recent Nike ad was from an animatic created by director Michel Gondry. The long (cinema) version even features Lara Croft caught in a somewhat embarrassing position with the hero, Leo. Buf adds, "The point of this work was to recreate a universe of the video game in which Leo goes through each game by showing his sporting prowess. The commercial was made entirely in 3D, with no live shooting required." It took five months to complete, and Buf employed a combination of in-house software, *Softimage*, *mental ray* and *flame**. Production by Partizan Midi Minuit.

Buf Compagnie

Modelling, animating and rendering – these are the traits you'd expect to find in an effects house. But developing your own in-house software and constantly developing revolutionary techniques to boot? Meet the smart alecs from across the Channel...

Buf Compagnie is a master in the art of disguise. You probably don't know its name, but there's no doubt you'll know its work. Seen *Fight Club*? The Chemical Brothers' *Let Forever Be* video? The recent video game-themed Nike ad? Thought so. Rather than shouting about its performance and brilliance, the company likes to brand its work with what it terms 'the Buf touch'.

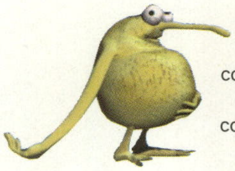
The company was founded in 1984, with the goal of creating complete 3D software alongside the production of computer films. The skills on offer were those of modelling, animation, parallel rendering, paint systems and editing systems, and its aim was to work on movies, commercials, music videos and special effects. You could say that it's more than achieved what it set out to do.

The company now has a whole rollcall of major credits to its name, and the list is ever-growing. As well as working on the major projects listed earlier, the company is also responsible for those Gap ads that have been ever-present on our television screens, as well as working for top names like Björk, Perrier, Peugeot and Hewlett-Packard. And with offices in Paris and Los Angeles, the firm's net over the planet is spreading wider.

But where did it all begin? The company was founded in 1984, and after a brief spell under another name, Buf Compagnie was born.

Buf says, "From the very beginning, animation of characters was one of the biggest assets of the company. Those coming into computer imaging today who complain about the machines not being fast enough – listen to this. There were five of us working on a single Intel 286, including rendering and compilation. And believe me, a 286 is much slower than any machine that your six-year-old cousin could buy to run *Doom* or *Duke Nukem*!"

After working in the industry for a few years, the company



completed France's first 'long animation', a six-minute 3D work about insects living in a computer. Since Silicon was too expensive, Buf developed a parallel system to finish the computation. And its self-sufficient philosophy is still alive and kicking, and very much the root of its success today.

There are now around 50 people working at Buf's Paris base at any one time, and the philosophy of the company, like the atmosphere, is very relaxed. Surnames are off the menu – everyone is known by their first name, and that goes for e-mail addresses too. And any views given are the views of 'Buf'. "Everyone helps each other out, whether it's on techniques or whatever." Collaboration is the name of the game, and it's what makes Buf the success it is.

So what of the company's major works? Well, 1999 was certainly an eventful year for Buf, with many high-profile projects on the go. *Fight Club* was one of the major films of 1999, but if you saw it, you may be surprised at some of the scenes Buf was involved with.

Buf told us, "David Fincher was the director given the task of visually representing the mental thoughts of Edward Norton's character, Jack. We were asked to complete six sequences for the film, including the sex scenes between Brad Pitt and Helena Bonham Carter, and the sequence of Jack shooting himself in the mouth (see below)." The artists involved used *mental ray* and in-house software to complete the task, plus its most recent research and development in 3D. The techniques allowed the artists to considerably lighten the shooting schedule, and all the special effects produced in 3D were based on photos shot on location.

Buf asserts, "The new technique gives us the possibility to produce a multitude of camera movements, which is impossible in live action shooting. By recreating a 3D environment, the director is able to have the freedom to choose any camera move – even impossible ones such as going through walls, or behind a fridge, or between a couple embracing. It also helps enhance the action of an actor shooting himself in the head. This technique gives the director the ability to direct every detail without having to reshoot."

The company is hoping to score more work from Hollywood, and to this end opened up a US base in 1998 – which is already paying off, says Buf. "We set up a production office in Los Angeles about two years

> **"Let Forever Be was created in honour of the 1970s, with kaleidoscope and mosaic effects. Our job was to create a transition and marry both worlds"**

Fight Club

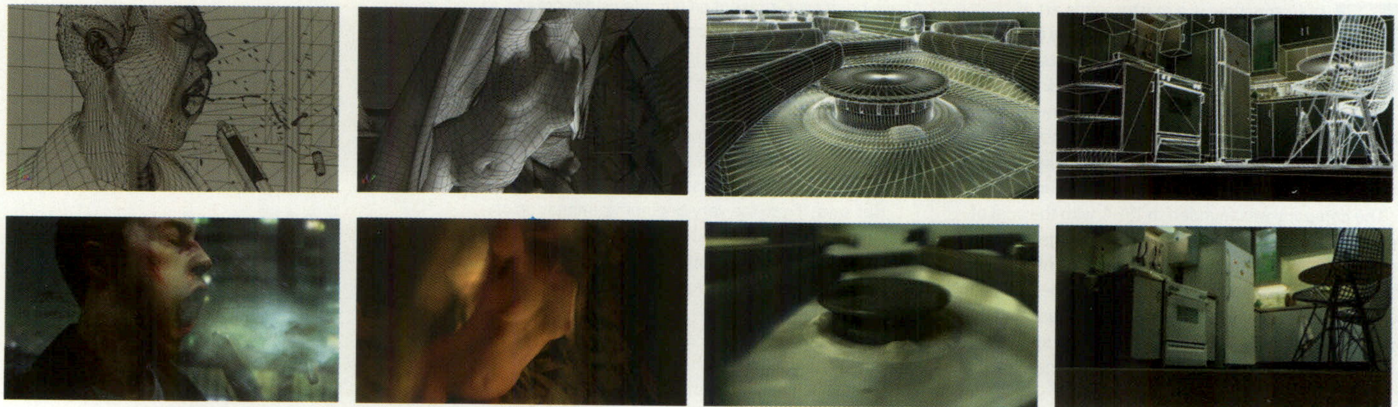
Always looking for new ways of doing things, Buf has developed innovative techniques for creating sequences, making it possible to infinitely control the movements of the camera, framing, focus and the degree of streak/blur effect v focus, with freedom from physical limitations.

These sequences are all from the movie *Fight Club*, for which Buf was commissioned to create six sequences. As these images show, by recreating the environment of the image in 3D, some spectacular shots and effects were achieved.

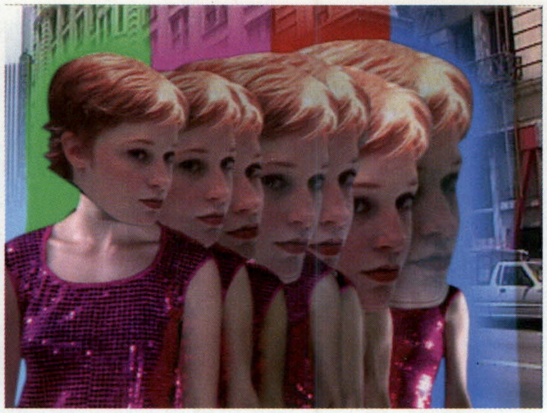
For instance, the stove sequence represents Jack's thoughts as he visualises the relationship between the burner from which the gas is escaping, and the refrigerator compressor spark, which ignites the explosion of the kitchen. Director David Fincher wanted to create a camera movement within the kitchen that had no constraints of space, speed, or weight and size. This was not achievable as a miniature, so the only approach was to do it in CG.

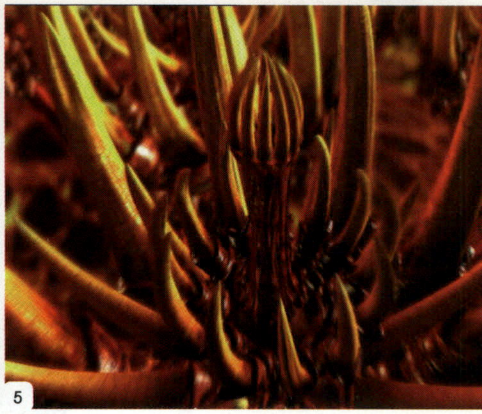
To obtain a truly photo-realistic result, Buf developed different tools, including a very robust depth of field tool. This tool was necessary during certain shots to recreate the appearance of a macroscopic point of view. Other processes, like motion blur, the noise and the film grain were added to complete the film look. Buf modelled the kitchen in 3D and textured according to reference photographs taken on the set.

Furthermore, during a shot where the camera passes at ground level, the precision of the photographs were insufficient, so the squares of linoleum, as well as the table and the chairs, had to be remodelled and lit in 3D in order not to give the game away.



Buf was asked to create six sequences for the movie *Fight Club* – five show the character Jack's mental path, and the sixth shows him shooting himself in the mouth. Buf used its most recent research and development in 3D to make the impossible possible: "The use of computer-generated images gave an enormous amount of freedom to the director." Images courtesy of Twentieth Century Fox.





ago, so we could get more work from America. The staff at this office are there purely as the face of Buf Compagnie in the United States. They meet clients, show them our demo reel, and they're the first contact with clients. It reassures people when they know we have an office in LA, and that they can deal with someone face to face who speaks fluent English. It's a good thing to have, as naturally, at first people don't want to deal with a company that's so far away."

As well as movie work, Buf's remit also spreads to music videos, animations and commercials. It had a hand in the Chemical Brothers' storming *Let Forever Be* video, and the all-singing, all-dancing Gap adverts of recent months, the latter borrowing some of the techniques from the former. Both were directed by Michel Gondry.

Buf told us, "*Let Forever Be* was created in honour of the 1970s, with kaleidoscope and mosaic effects. Our job was to create a transition, and in between, to marry both worlds. Starting with one talent, our challenge was to multiply the talent – or starting with multiple talents, we had to end with just one."

Those working on the job created 23 transitions in all, and each one was between 15-50 frames long, with an average of 30. As for software, the artists again favoured in-house software, as well as using *Elastic Reality*, *TMorph*, *Softimage* and *mental ray*. The team didn't use any compositing, and the video, which was also nominated for a Brit award, won third prize at the Pixel-INA awards for best music video.

Inspired by the techniques used on the Chemical Brothers video, Buf was also called in to contribute to the recent Gap adverts. Again, these were done using in-house software, plus a mix of *Softimage*, *Elastic Reality*, and *mental ray*.

Buf adds: "The work consists in the realisation of transitions in three spots, Gap mountains, Gap trees and Gap Kids. The transitions were made to give the illusion of a sequence shot making the dancers appear and disappear, coming towards you and going backwards, giving the impression of the substitution of a dancer group into a skater group, or a group of kids to one single kid.

"All the transitions – 18 of them – were created with the intention of hiding as much of the effects, to maximise the visual impact."

Director Michel Gondry has a close relationship with the company, and asked it to work on the stunning Nike video game-themed ad which was shown recently, too. It's fast-moving, and as with the Gap ad, it sticks in the mind.

It took five months to complete the mini-epic, using a combination of in-house software, *Softimage*, *mental ray* and *flame**. The task was to build 11 sets and interactive graphics, create and model all the characters, and then animate and render the whole shabang. Cue a great deal of cranking machines on overdrive.

Buf emphasises: "The main challenge was to successfully create a multitude of sets and atmospheres that were unique to each other."

To facilitate all this work, and to ensure the job is done to perfection, Buf uses a wide range of hardware and software, keeping its own whizz-kids busy. It says, "Engineers excel in solving the problems presented by commercial software. Since 1985 the team has developed all the necessary software and tools for doing a complete film." The company favours Silicon Graphics machines, runs PCs under Linux, plus Macs and a plethora of video and scanning equipment.

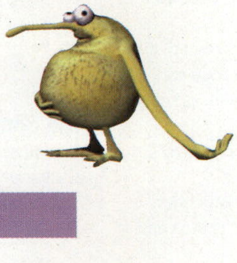
It has also developed new algorithms – new techniques of texturing, motion-blurs, soft object animation, a sophisticated animation language (close to C), a camera matching system, a stereo modelling system, depth-of-field and smoke simulation.

As for its other tools, Buf prides itself on using its own custom software too, alongside the likes of *Softimage/3D*, *Softimage/Eddie*, *mental ray*, *Alias/Wavefront*, *flint**, *TMORPH*, *Elastic Reality*, *Photoshop* and *flame**. Quite a line-up.

When we asked what projects were coming up, the company was reluctant to speak about what it was working on. It has very close relationships with its production companies and directors, and says the work "is a day to day thing".

For all of its stunning efforts, Buf has been rewarded with global praise, and projects it's had a major hand in have often been on the receiving end at awards ceremonies. Gongs have come at Siggraph, Imagina and Cannes, to name but a few.

It concludes, "A mix of artists and software engineers has enabled Buf Compagnie to adapt to the needs and desires of film directors and offers them new possibilities in terms of special effects." It's hard to argue with this summation, and you get the feeling that although this company is well into its teenage years, who knows what it might be capable of when it comes of age... ca>s



You can contact Buf Compagnie on [t] 0033 142 681 828, [e] contact@buf.fr or [w] www.buf.fr

4. Nominated for a Brit at the beginning of the year, the video for The Chemical Brothers' *Let Forever Be* is extremely clever and entertaining. Directed by Michel Gondry, Buf contributed to the transitions for the piece.

Buf says, "The aim of the video was to shoot it using two media – video for the real world and 35mm for the effects that needed to be created in post-production.

"The last image of the dream sequence becomes the first image of the real world and vice versa. Frame after frame, talents and objects have to transform to become the resulting image. The challenge for the artists was to create between frames." Production by Partizan Midi Minuit, distribution by Virgin.

5. This image is taken from a production called Sci-fi. Buf explains, "This job involved the creation of three different computer-generated universes – microscopic and organic, placental and skeleton. Each involved differing tasks, but namely the modelling, animation, lighting and rendering of the universes, planets, plants and creatures." Again, in-house software was run on the company's bank of machines to create the effects, plus *Softimage* and *flame. Production by Le Village.**

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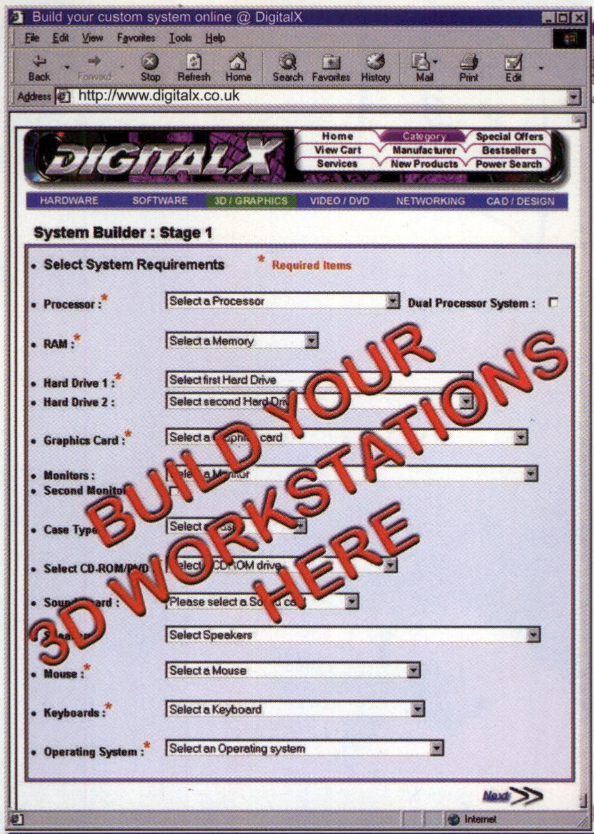
The closing date is 30 June 2000. Employees of The Future Network, MetaCreations, Stewart-Muir Communications and any of their agents or families, may not enter the competition. One entry only per reader. The editor's decision is final. No correspondence will be entered into and there is no cash alternative. No purchase necessary. ca>s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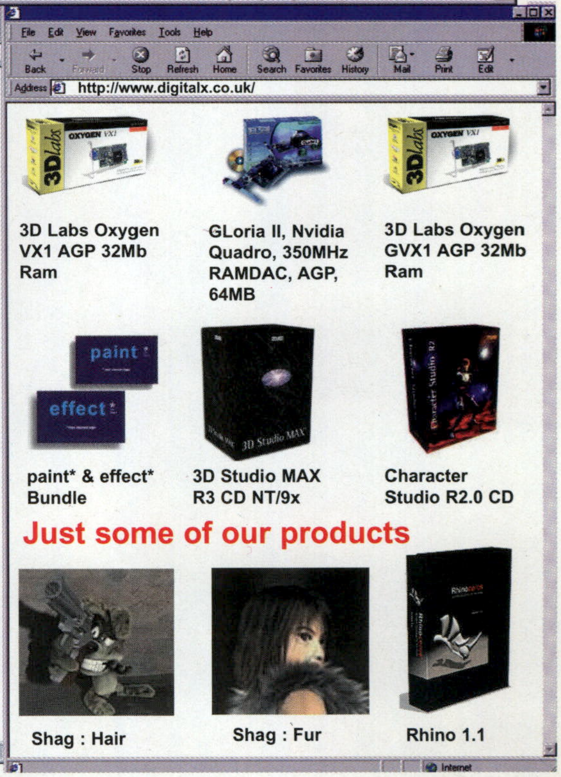
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83 tips

Life just got a whole lot easier with our essential tips for five of the best 3D software packages around

No matter how much of a wizard you consider yourself with a particular software package — or indeed, how much of a beginner you consider yourself — tips from people who have been there and done that can be a lifesaver. You never know when you're going to find a quicker way of doing something, or discover a feature you just didn't know was there.

So here are 80 tips for five top packages — plus three more vital, fundamental ones you should always bear in mind.

Memory test

You can never have too much RAM. 3D software is the most memory-hungry beast ever invented. If you think you're happy with 64MB, double it and see just what a difference it makes. Likewise, really complex scenes might need more than that 256MB you're pleased with.

Pro stars

Learn from the pros. Whenever you can, get hold of pre-made scenes (there are plenty on the Net) and rip them to shreds — study how the modelling, texturing, lighting and so on are implemented.

Keep it simple

Simplest is usually best. Keep your models as simple as possible to help with speed. Don't go overboard with 5MB textures unless they're really needed. Don't use raytracing unless you really want perfect reflections. Look for a simpler way of doing what you're trying to do.

trueSpace

Pixel power

When file rendering you have an extra option – Pixel Aspect Ratio – which can have some interesting effects. Increasing this number to say, four or five, produces a Cinemascope widescreen effect in the rendered image. Reducing it below one produces vertically stretched results.

Flip out

This has to be one of the simplest tips. If you have an object the wrong way up, what's the easiest way to flip it? Simply open the Object Info panel by right clicking on the pointer icon. If the Z height of the object is 10 then make it -10. And it works just as well in the X and Y directions.

Library ticket

Often you may want to have multiple objects follow a path, or make objects from that path. The method is simple – put the path in the library. Then you can select any object and reference the path. When in the library the path can be made into a spline, which can be used for modelling.

Moonstruck

Need a quick orbiting moon? Make two spheres, one big at 0,0,0 and one small, directly above it. Select the moon, click on Axis, then Normalise Location then Axis again. When you rotate the moon turn off Z and the moon will move in X and Y around the planet.

Rough trade

Computer graphics can look unrealistic because objects are just too perfect. Make some small three-sided cones and then Boolean them from object edges to rough them up a little. These nicks and scratches make for much more convincing images. If you can coincide scratch texture effects with these then so much the better.

Art of landscapes

Making landscapes is remarkably easy with surface deformation. Simply create a plane and Quad Divide it five or six times to produce a grid. Select Sculpt Surface and start by pulling vertices up in the Z direction. Soon you will have undulating valleys and mountains aplenty. You can duplicate nice formations using Copy Deformation.

Zero tolerance

Radiosity can produce some great results, but you need plenty of time in order to experiment. To speed up your tests, set Iterations to zero. This will speed up things dramatically as *trueSpace* won't try to render each step. At the end of the process, just render once to see the result.

Spark plugs

The Internet contains many free plug-ins for *trueSpace*, some of which are very useful. We recommend the excellent *trueView*. This enables you to name and organise your objects using a simple tree hierarchy. Check out **[w]** www.caligari.com/tsx/Free/free.htm for more.

Different strokes

trueSpace's ability to render in different styles and quality can be used to great effect. Render the same design to a file in wire, hidden line, low quality and high quality. Next simply blend the images, and then in *Photoshop* use layers with masks to create show-through sections.

Net benefit

Are you a complete newcomer to *trueSpace*? There are two places you need to visit. The first is the Caligari homepage **[w]** www.caligari.com, which features absolutely loads of links and inspiration. And if you're in urgent need of some expert assistance, be sure to subscribe to alt.graphics.truespace – a newsgroup just for *trueSpace* people, where you can post your enquiries and discuss the latest 3D graphics.

LightWave

Friendly folders

Set up your own Object, Image and Scene folders in *LightWave's* Object, Image and Scene directories. Remember to give them names like A_Scenes or similar (Mac users can uses spaces) – that way, whenever you need to open a file, your folder is always at the top of the list.

Come together

Use Modeller's Merge command on complex models from time to time (this merges points that are near enough to be counted as one and the same). You'll be surprised how many points can be removed – especially from the older models that are installed with *LW3D*. Keeping model data at a minimum is the key to rapid rendering times.

Vital statistics

On a similar topic, get used to using the [W] command in Modeller to bring up the Polygon Statistics panel. Keep track of all those useless one-point polygons and render-phobic non-planar polys – non-planar polygons can then be tripled individually. It's also a great tool for selecting just those polygons with a particular surface.

Welding gear

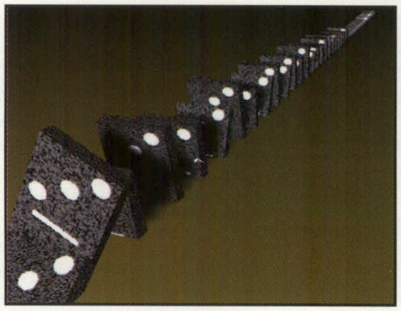
The Weld tool in Modeller joins groups of points together – though not at a location equidistant between them, as many people think, but at the location of the last selected point. Knowing this makes Weld a much more useful tool.

Details, details

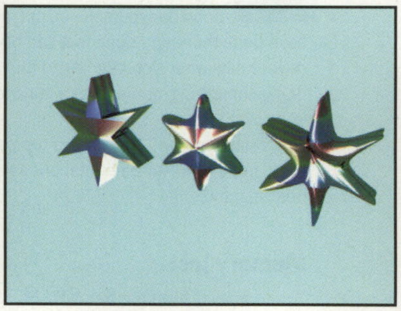
To save polygons on models with small, repeating detail (like a spaceship, for instance), model a complex area and texture map it as usual. Light it to match the lighting in your scene and then render it face-on, full-screen. You can then use this texture map to

To the MAX

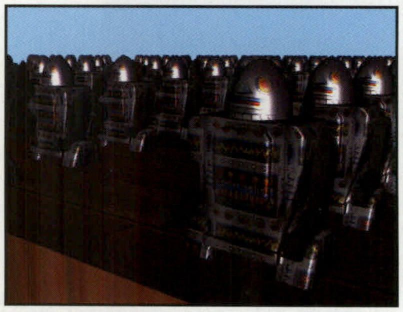
Over the next few pages, you can find 20 essential *3D Studio MAX* tips and shortcuts under the headings of Performance, Modelling and Animation…



Dynamics can be useful, but there are a few problems with its implementation



The tessellate and mesh smooth modifiers can give a more organic feel to a simple shape.



Using Instances of an object is a good way to create many identical models.

realistically detail your model without adding tons of unwanted polygons.

Enter the scene

Opening up all the various bits of a favourite multi-part object is a pain. To avoid this, set up a scene, with all running lights and animations in place. Delete the main distant light and then parent everything to a single null. Save the scene with an appropriate name. Now whenever you need this object, use Load From Scene on the null – it will bring in the whole object, lights, animation and all.

What's the story

Plan ahead. Storyboard your animation, think about model design beforehand, and consider what output you'll be using, whether it's still images for print, or movies for the Web, CD-ROM or TV. It's pointless using a high-resolution, high-antialias output if you're only ever going to put it on the Web – you're just wasting render time.

Forest fire

Polygonal trees are incredibly slow to render. Instead, use a single polygon, texture-mapped with a tree image and with a tree-shaped negative clip map to make the edges of the polygon invisible. As long as the polygon is always facing the camera (and not too close) then it should look just like a realistic tree. Alternatively, you can use the same clipped polygon several times in a cross-shape.

Sight unseen

Don't bother wasting valuable time sculpting detailed models or using high-res texture-maps on objects that are seen only fleetingly or at a distance. If you never see the backside of a building, for instance, open it in Modeller and delete all those unseen polygons. Then simply save it with a different name and then use Replace Object in Layout. The new model will render a lot more quickly.

Crack down

Sometimes you'll find smooth objects that render with unsightly cracks around polygon edges. Don't panic. These are often caused by double-sided polygons (with normals that point both in and out) or non-planar polygons. You can either open the Surface panel and uncheck the Double Sided option, Triple the mesh to remove non-planar polys, or, if the problem persists, turn off the Self Shadow option.

Shadow lands

A similar problem occurs with shadows that have a number of triangular gaps in them. These are due to non-planar polygons which *LightWave* seems to have an awful lot of trouble rendering. In Polygon select Mode, press [W] to bring up the Statistics panel. Next to Non-Planar Polygons, click the [+] button to select them, and then simply Triple the lot. This should solve the problem.

Scale model

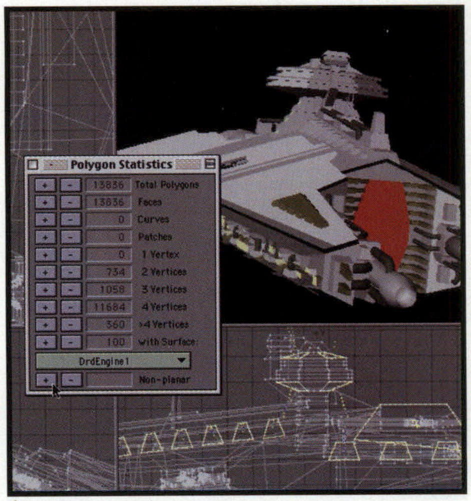
Get used to building in scale. *LightWave's* Modeller is just as happy working in km and it is in mm. If you build all your models to the right scale – people 1.5m tall, cars 4m long and so on – then you can mix and match models between scenes without having to scale them or, worse case, rebuild them from scratch.

On the map

When mapping, the only image map that needs to be 24-bit is the colour texture map. Maps for specularity, diffusion, bump and so on should be reduced to an eight-bit greyscale images (and often can be reduced in resolution, too). Just a few seconds spent in *Photoshop* can save megabytes of image information in *LightWave*.

Ambient works

LightWave's default setting for ambient light is 25 per cent which is unnaturally high. Turn this down to around five per cent when rendering, or better still, turn it off

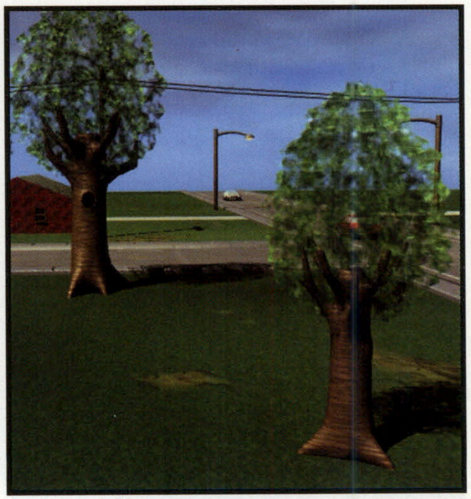

Polygon Statistics

+	-	13836	Total Polygons
+	-	13836	Faces
+	-	0	Curves
+	-	0	Patches
+	-	0	1 Vertex
+	-	734	2 Vertices
+	-	1058	3 Vertices
+	-	11684	4 Vertices
+	-	360	>4 Vertices
+	-	100	with Surface:

DrdEngine1

+	-		Non-planar

Using the [W] command in *LightWave* enables you to select just those polygons with a particular surface.



Polygonal trees are slow to render in *LightWave*, so instead use a single polygon, texture-mapped with a tree image.

MAX Performance

Six of the best ways to get *MAX* performing like a pro…

Hide and seek

Always hide anything you don't need. Using the hide function really speeds up redrawing of the viewports, and it also stops you from accidentally selecting objects when you're trying to work on other elements. You can see what you're doing much easier, and work a great deal faster.

Freeze frame

If you don't want to select an object, but you still want to see it, remember to use the freeze function. Frozen objects will still appear in the viewports and they will render normally. However, they will appear grey and they won't be selectable all the time you're working on the scene.

Levels of detail

Use the Optimize modifier to create different levels of detail for rendering and viewport display. This can be very useful if you're working on detailed models. Using a low polygon version of the model in the viewports will allow you to move objects and play animations in real time, but it won't affect the rendering quality.

Collapsible models

You can often improve performance by collapsing a complex model to an editable mesh. However, be warned that you shouldn't do this unless you're completely sure you won't want to go back and alter it later – because you won't be able to.

Essential selection

Be sure to use selection sets. If you're working with a complex scene you'll often find yourself needing to select and manipulate many objects at once, and selecting them all can take a while. If you give your selection a name, you can re-select any set of objects with a single click.

Clocking off

You can manipulate objects about the world's axis or about the object's own local axis. This can be very useful. For example, if you've designed a clock face, and rotate it to position it on a wall, then you'll probably use the world's axis to do so. If you then want to rotate the hands to alter the time, you'll have to spin them about their own local axis to keep them in line with the face.

and use distant lights to replicate ambient lighting. Use say, six distant lights in a circle, all pointing at the centre of your scene. The resulting image will look much more realistic.

Fractal noise

A quick 'n' simple way to add remove the computer-generated look of models is to add a subtle layer of fractal noise in the Diffusion channel, just to break up the regularity of the texture. Also, adding dirt, dust, grime, rust, clutter and general chaos to your images will help to increase their realism (if that's the effect you're after).

Metallic effects

Texture Size values can be used with procedural textures to create a variety of effects. For example, activate fractal bump mapping, then use tiny values leaving one axis a factor of ten larger, such as X (0.0005) Y (0.005) Z (0.0005). With a suitably metallic texture, this will produce a nice etched metal effect. Explore different values and settings.

Take control

You can use the Control key to create dolly shots with the camera. Point the camera at an object and switch to Perspective mode. Lock the X and Y axes and move the camera – it moves along the Z axis as expected. Now do this with the [Ctrl] key pressed, and the camera dollies in and out of the scene in the direction it's currently facing.

WAV hello

The PC version of *LightWave* can load .WAV files. Activate *LW*'s experimental features by pressing [Ctrl-Shift-F1], and then open the Scene Editor panel. You can also load .WAVs into Morph Gizmo – open it, then type 'wave' on the keyboard and a new set of options should appear.

Surface active

You can surface individual polygons before they're actually created. Once a polygon is selected, open the Change Surface panel [Q], create a new surface and Apply it. Now when you perform a Bevel or Smooth Shift, the new polygons are already surfaced. This can save loads of time, especially with complex models.

Smashing glass

For realistic glass surfaces, create an object and give it a surface called Glass. Duplicate this object and paste into a new layer. Flip the normals and give this a surface called Air. Paste back into the first layer and merge points. In Layout, make the Glass surface 90 per cent transparent with a refractive index of 1.6, and the Air surface 95 per cent transparent with an index of 1.0.

Cinema 4D

Third dimension

Use the right mouse button (Macintosh users, use hold down Apple key and click the mouse button) to move in the third dimension in the editor window.

Spline problems

If you experience problems extruding imported splines, double-click on the spline dialogues and check that the Close Spline option is selected.

Copy cats

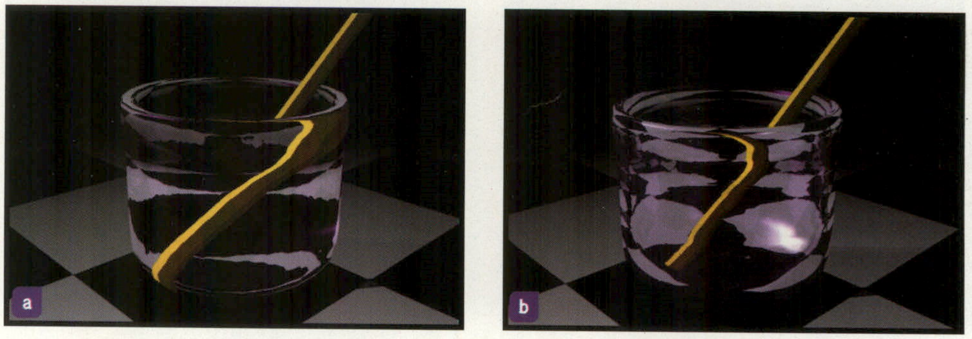
To quick-copy objects or property icons in the Object Manager, hold down [Ctrl], drag out a copy and drop it in the new position. This also works for keys and tracks in the Timeline.

Shining bright

If your scene lacks objects to reflect, simulate shiny materials by using the environment channel in the material edit dialog. For instance, use 80 per cent brightness (the S value) for the colour and 20 per cent brightness (the S value) for the environment. For the environment texture, try using a scanned photo (of a room, trees and so on). Once you find a photo that works well, you will be able to use it again and again. Quality environment maps can make a huge difference.

Smooth deformations

When deforming an object (for example, with a bend track), make sure there are plenty of subdivisions – use the subdivide tool to increase the number of polygons which in turn will make for smoother-looking deformations and animations.



If you want to create realistic glass surfaces in *LightWave*, be sure to incorporate an air surface. You can see the difference it makes from these two images, where [a] looks a lot less realistic than [b], which does include an air surface.

MAX Modelling

Seven secrets behind successful *3D Studio MAX* model making

Organic menu

The Tessellate and Mesh smooth modifiers can make complex organic-looking shapes out of simple objects. It can be difficult to predict the results of these modifiers, but you can go back down the modifier stack to alter your simple primitives until you get the result you want.

Identical objects

If you want a lot of identical objects, create them as instances rather than copies. That way they use up less system resources. You can also make changes to one object, which will affect them all.

Breaking up

Got a really complex object to map with a material? Traditional mapping methods will probably produce smeared or ill fitting textures. Try breaking your object into parts, mapping the parts individually, then re-assembling it.

On-line designs

Check the Internet for public domain clipart. There's a lot of it about. There's little point spending hours designing an office chair if it's going to be just decoration in your scene when you can download a free model and use the time you've saved to work on more important aspects of your shot.

Experiment!

Most aspects of any part of a model can be altered at the sub-object level. It's a good idea to just knock up a rough version of your model, quickly, then work out how to refine it later. This works with animation too. Don't be afraid to just try ideas because *MAX* usually provides a way for you to undo or refine it later.

Keep a back-up

Make copies of your files under different names and different levels of completion. You never know when you're going to want to go back to a previous version of a model or animation.

Reference point

Import your reference material into *MAX*. If you have photographs or drawings of the object you're modelling, import them as backdrops to your viewports. That way you can model more accurately.

Bright light

To control the brightness of a light source, create a copy of the light source. Set the copy's Shadow value to None (General page of light source dialog). Share the original brightness between the two lights – the more the balance swings towards the copy, the lighter the shadow becomes.

Dark matters

General soft shadow tips: the lower you set the bias (general page of light source dialog), the closer the shadow moves to the object from which it is cast. The default value of five per cent is somewhat cautious and can often be reduced, eg to 2.5 per cent. Reduce with caution though, since shadow anomalies may appear when the bias is set too low (hence the large default value). For a more precise soft shadow, increase the size of the shadow map eg to 768x768 pixels.

HPB angles

HPB angles always refer to the parent object apart from the object at the top of the hierarchy, which refers to the world coordinate system.

Lathe objects

The lathe object always revolves around its *Y* axis. Rotate the object's axes to change the direction on the lathe. This also works for the Sweep NURBS object too.

Faint reflections

Why can't you get faint reflections (below 15 per cent) in your scene? This is due to the Threshold value on the Options page of the render settings – this value marks the point at which the raytracer gives up tracking beams (to save time). Set the threshold value to 0 per cent, then the faint reflections will appear.

GOing, going...

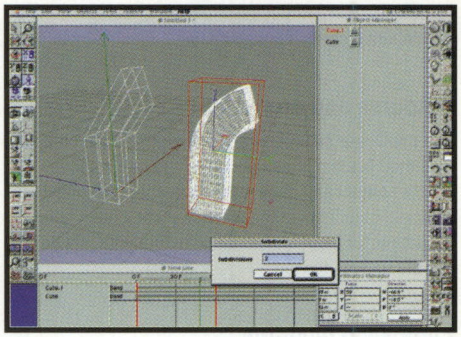
Cinema 4D GO has no spline animation track. However, you can still have an object move along a spline: create the spline, select the object in the object manager, then select Tools>Animation>Spline To Position Track. Type the name of the spline into the dialog that opens, then hit OK. The object will now follow the spline when you playback the animation.

Zooming in

If you use the Zoom tool for quick navigation, be sure to set the camera's focal length to the required value before rendering! (The Zoom tool will cause the focal length to change, as with a real-life zoom).

Cap and round

To cap and round an object (for example, a cylinder with no caps), select all the points at the end in question. Next, in the Structure Manager, choose Polygons>Convert To Spline then double-click on the spline icon in the Object Manager. Activate the Close Spline option in the dialog that opens and set Intermediate Points to None, then click OK. With the spline still selected in the Object Manager, create a skin object (Objects>Spline Objects>Skin) – note that you can also apply rounding on the Caps page of the Skin dialog. To weld the cap and rounding together, use the connect command followed by the Optimise command (both these commands are on the Tools>Structure menu). To weld the entire mesh together, connect and then optimise the whole thing.



The object on the right has been subdivided to make the bend effect much smoother.

Light and shade

If shading anomalies occur, especially with imported meshes, try aligning the normals (Tools>Structure> Align Normals). Normals are lines that extend perpendicular to a facet that tell the renderer which direction the facet is pointing. You generally need them to all point in the same direction (all out or all in). Be sure to use Display Mode Options to view the Normal of a selected object.

Saving textures

If your scene is to be used on another computer, remember to use the Save Project command (File menu). This will place all the textures used by your scene in a Tex sub-folder, ensuring that all the textures are included with the scene.

Taking the tablets

If you experience problems with a graphics tablet (commonly ultra-sensitivity), check that the Graphic Tablet option is activated on the General page of the general preferences.

Carefully does it

Be extremely careful whenever you're using the Expand Object Group function in *Cinema 4D* – the parent will be deleted. The command is actually intended for objects that were grouped with the Group Objects command (the parent of which is simply an empty object, which is deleted when expanded).

Object manager

If there are hundreds of objects in your scene, it can be time consuming to locate a particular object in the Object Manager. Instead, select the object in question in the editor window, then select Search Active Object from the Object Manager's Function menu. The object will be placed in view (hierarchies are opened

MAX Animation

Seven tips to prevent you going back to the drawing board

Dynamic trouble

MAX has problems with dynamics. If you're trying to create a dynamics simulation, where *MAX* calculates the motions of objects as they collide with each other, bear in mind that there are a few problems with the code, and objects can fall through each other. Try making the collision detection mesh-based instead of bounding-box-based, and increasing the mesh density of large objects.

Unexpected motions

Do your animated objects overshoot your key points? *MAX* tries to make your animations into smoothly curving paths. This can result in unexpected motions, especially when keyframes are a long way apart. Right-click on the keyframe in track view to choose a different way of moving from one key to the next.

Pivot points

Pay attention to pivot points. If you're animating an object, you'll need to decide what point it rotates around. If it's a ball spinning in space, its pivot point should be at its centre. If it's rolling off a ledge, it will need to tip about an axis on its edge.

Power protection

Render animations as numbered still frames rather than video files. That way, if you lose power, have a system crash, or need to stop and start the rendering process, you won't lose what you've already done.

Keyframes count

Try to make your animations with as few keyframes as you can. Trying to 'fix' an animation by just adding lots of keys rarely works and makes it harder to edit.

Frame one

When you create a first keyframe for an object, *MAX* creates another at frame 1 of your animation. Often you'll want the motion to start at a different time, so just drag the initial keyframe to wherever you want the motion to begin.

Motion capture

Use motion capture to create organic movements. You can set *MAX* to record the movement of the mouse, or keystrokes as an animation plays, and use those inputs to govern the animation of any part of the scene.

automatically), giving you immediate access to the relevant properties.

Propeller heads

Have you ever wondered what the *Propeller* plug-in does? It has no practical use for normal *Cinema 4D* users – it is used as a teaching aid for those learning to program in C.O.F.F.E.E., the native plug-in language.

Chain reaction

Place an empty object at the end of your IK chains and pull on the empty object when you use IK. If you don't do this, though the objects further up the chain will rotate about their axes, the object at the end will not.

Bryce

Textured gel

Light can be made to be volumetric in *Bryce 4*. Click the E icon to edit the light parameters and set Volumetric from the pop-up menu. Adding a texture as a 'gel' causes the colours to be spread through volume.

Dim the lights

Don't forget that lights can have negative intensities too. This has the effect of removing light from a scene rather than adding it. It's useful for controlling lighting.

Rotating views

Many of the nano-views in *Bryce* can be rotated by clicking and dragging, but you can also zoom then by holding the [Ctrl] key. [Option]/[Alt]-clicking restores the default view if things go awry.

Disperse and drop

Use the Disperse tool to randomise a group of objects (selected but not grouped). Place the group above another object and click the Drop button to place the selected objects over the surface of the object below. It's not perfect, but it's handy for naturalistic, scattered effects such as stones.

Photoshop plug-ins

You can use some *Photoshop* plug-ins directly within the Terrain Editor's Filter Tab. From the drop-down menu choose the Select Plug-in Folder... option and navigate to your *Photoshop* plug-ins folder. Restart *Bryce* to use the new plug-ins (*KPT 3* for example). Not all filters will work this way though.

Exporting textures

Export any *Bryce* procedural texture as an image map by applying it to a terrain object and then Exporting the Terrain as an Obj format model. Textures are then exported as separate image files: you can specify the resolution of the images, image format and export separate maps for each material channel all at once. Of course, the textures will no longer be procedural once they're exported.

Sunburst

You may find that even though you are rotating a view, the lighting doesn't seem to change. You probably have Link Sun to View enabled which keeps the Sun, well, linked to the view orientation no matter which direction you look. Turn this off to get the effect you expect to see.

Alpha masks

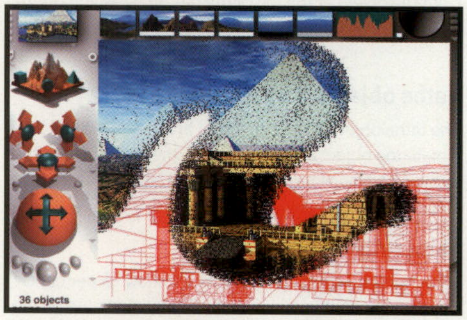
To create an alpha mask for an object you must select the Mask render type from the Render options pop up and render a separate pass. Only selected objects are rendered, which is a useful way to remove the infinite ground plane from the mask.

Depth charge

Likewise Depth and Altitude renders can be created in a similar fashion. These can be used as masks in *Photoshop* to create effects such as Depth of Field and other optical wizardry.

Speed of light

When setting up lighting it can be useful in the early stages to Disable all textures. This will make the nano preview and any test renders much faster but will still let you see the effect of any lighting changes.



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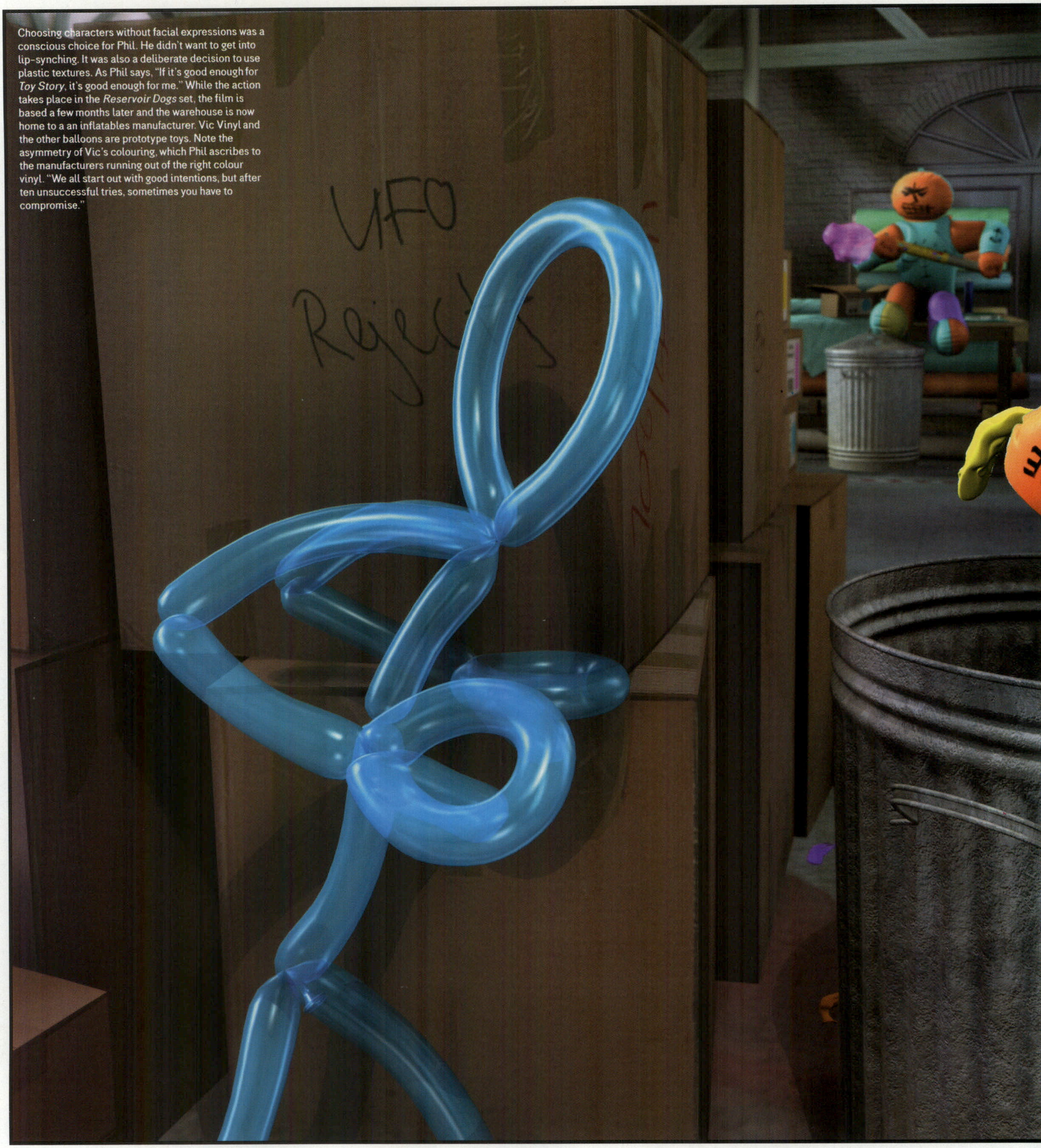


Choosing characters without facial expressions was a conscious choice for Phil. He didn't want to get into lip-synching. It was also a deliberate decision to use plastic textures. As Phil says, "If it's good enough for *Toy Story*, it's good enough for me." While the action takes place in the *Reservoir Dogs* set, the film is based a few months later and the warehouse is now home to a an inflatables manufacturer. Vic Vinyl and the other balloons are prototype toys. Note the asymmetry of Vic's colouring, which Phil ascribes to the manufacturers running out of the right colour vinyl. "We all start out with good intentions, but after ten unsuccessful tries, sometimes you have to compromise."

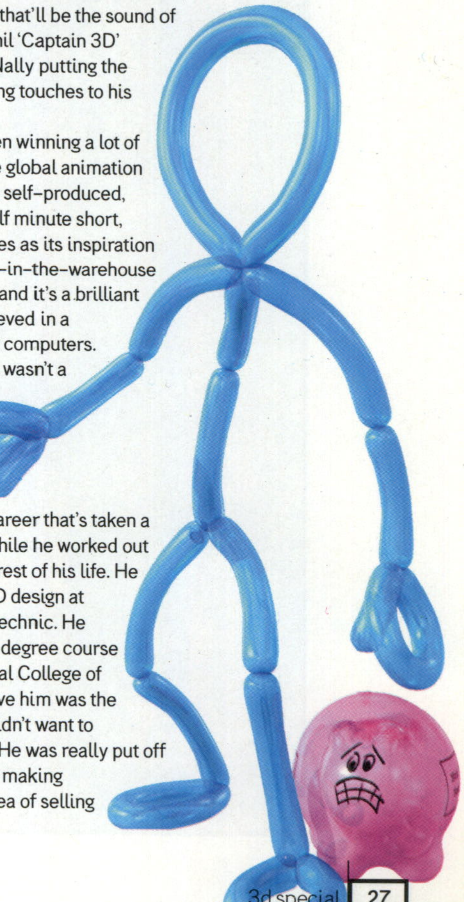
Phil McNally

This animator wants to prove to himself and the world he's got what it takes.

Stay alert if you ever find yourself in Camberwell just before dawn. In between the noise of the early-bird planes passing overhead on their final approach to Heathrow, you might just be able to hear the strange squeak, squeak, squeaking of rubber being tortured. Like as not, that'll be the sound of Phil 'Captain 3D' McNally putting the finishing touches to his latest computer animation.

Just recently, Phil has been winning a lot of praise and attention from the global animation community with his amazing self-produced, self-funded three-and-a-half minute short, *Pump Action*. The movie takes as its inspiration the memorable cop-tied-up-in-the-warehouse scene from *Reservoir Dogs*, and it's a brilliant example of what can be achieved in a normal home, using ordinary computers. The really funny thing is, Phil wasn't a professional 3D animator at the time that he created the movie...

Like so many creative types, Phil's had a career that's taken a number of twists and turns while he worked out what he wanted to do for the rest of his life. He did a three-year course in 3D design at Newcastle-Upon-Tyne Polytechnic. He followed that with a Master's degree course in furniture design at the Royal College of Art. One thing that course gave him was the certain knowledge that he didn't want to make furniture for a living! He was really put off by the physical process of making things. "I toyed with the idea of selling



virtual furniture by video tape," explains Phil. "We'd build a single chair or whatever, then people would pay their ten pounds and receive a video of their chair and that's it. I really liked the artistic side of furniture, but the process of mass producing it was a real turn off."

During his time at the Royal College, Phil took a one-day course in holography, and it was during that course that he acquired both a love of 3D photography and his Captain 3D moniker. "It was kind of embarrassing," admits Phil. "I mean, my nickname was because of 3D photography, but people would call up and expect me to know all about computer 3D but I knew nothing."

At that time Phil had no interest in computers, but his partner Deepa, whom he met at the College, is a graphic designer and she bought a Macintosh. Phil discovered computer games, but after a few months of playing, he wanted to discover more.

At first he used *Photoshop* to create red/blue anaglyphs — those pictures you look at with a pair of glasses that have red and blue lenses. Then he got a contract to design some simple graphs for a medical company's marketing seminar. He bought a copy of *Strata Studio Pro* and designed some simple box graphs. "I got quite excited when I saw that, by changing textures and things, you could get a lot of mileage from just a single model. Unlike making furniture where you build one thing and that's it." That was enough to give Phil the bug.

His next commercial opportunity arose when one of Deepa's contacts, Bim, received a grant to pay for tuition and he employed Phil to teach him about computer 3D. "At that time, *Cinema 4D* had just come out, along with *Strata Studio 2*, but as *Studio* was getting bad reviews, I went with *Cinema 4D* instead. *Cinema 4D* was reputed to have a fast ray tracer, and that was important because I had planned an animated movie as part of Bim's tuition," says Phil. Far from being the highly qualified teacher you might imagine,

It was during the course that Phil acquired his Captain 3D moniker

Phil showed great attention to detail when it came to recreating the *Reservoir Dogs* set in digital form.

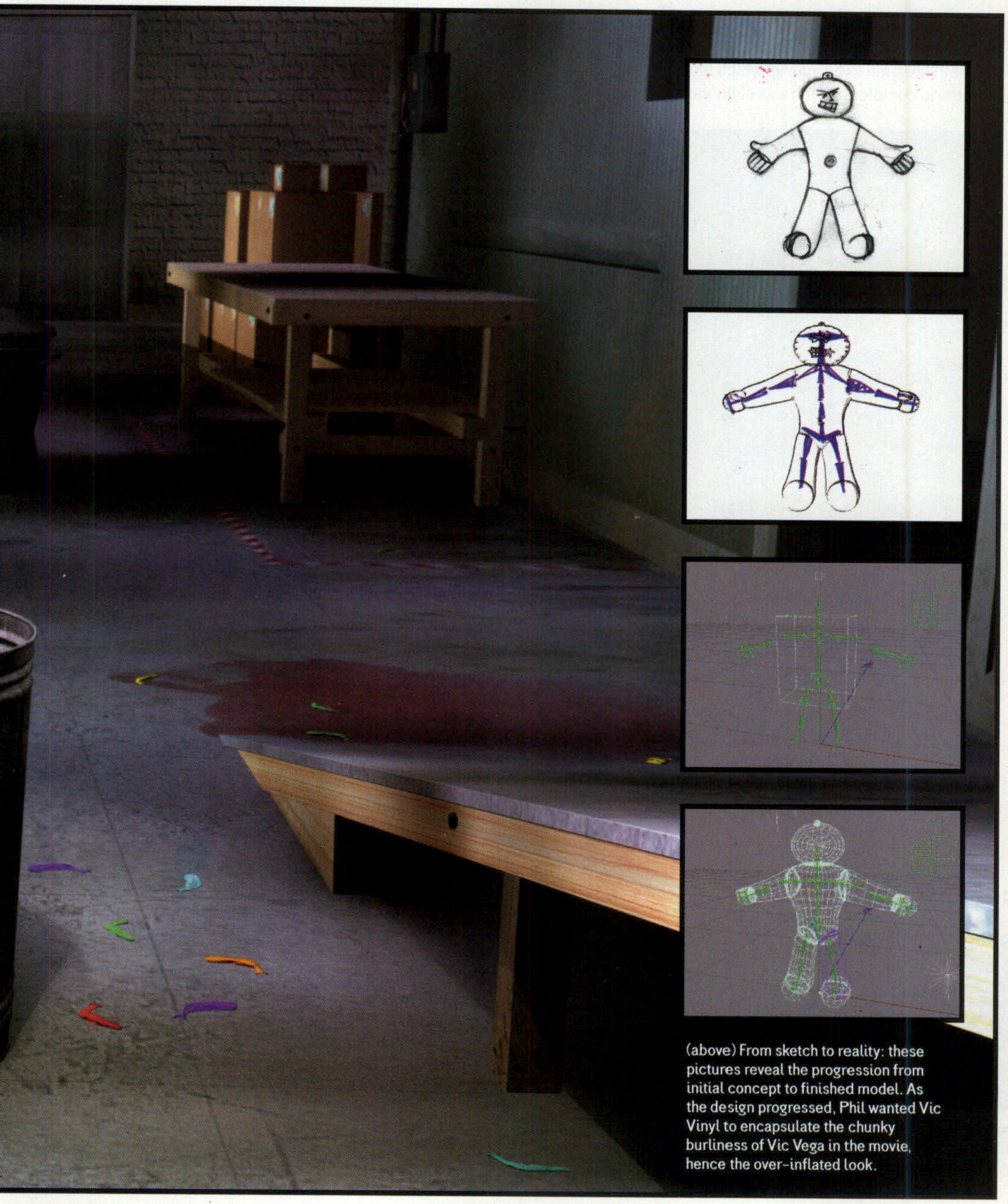
Phil barely knew more about his subject than his student, and as he says, "I was teaching myself at the same time – I saw it as an opportunity to be paid to learn. I was only a few weeks ahead of him in my knowledge!"

In November 1998 Phil attended LEAF, the London Effects and Animation Festival, taking a video demo of his work along with him. While he was there, he forked out £300 to attend the major seminars – at the time his car was only worth £400! He says it's an investment that he never regretted, and one that he recommends to any would-be animator.

One of the seminars was co-hosted by Marilyn Friedman, recruiter for PDI – the animation house responsible for *Antz*. During the question and answer session, Phil asked Marilyn, "What are the things that you never want to see again in a prospective employee's demo tape? She responded, "Spaceships, spinning logos, porn and feet that pass through the floor as they walk."

"My showreel at that time featured spaceships and logos – I hadn't even got as far as bad character animation... I'd already submitted it so I said to her, 'Okay, I'll give you a better reel next year' and that was my motivation.

"After seeing *Small Soldiers*, *Antz*, *Toy Story* et al at the festival, I thought to myself, 'what am I doing sitting in my back room when I could be part of this – of something bigger'. There's a lot of times when you look at something and say 'I could do that' but sometimes you have to say 'I am going to do that'. I really liked the look of the industry – everyone



(above) From sketch to reality: these pictures reveal the progression from initial concept to finished model. As the design progressed, Phil wanted Vic Vinyl to encapsulate the chunky burliness of Vic Vega in the movie, hence the over-inflated look.

Ten essential tips

Phil McNally reveals the secrets behind successful animation

1. Be very clear about what you're trying to achieve. Be sure of your objectives and keep reminding yourself of the end product.

2. Consider the practicalities. You'll have to dedicate a long time – at least several months – to achieve your magnum opus. You have to be prepared to make it the most important thing in your life for a while.

3. Another reality is the limitations of the equipment you have available. There's no point in designing scenes that are unrenderable.

4. Plan your shots. Edit first and shoot later. There's no point wasting days animating just to edit it out.

5. Use a camcorder to do videoboarding – planning your camera angles. It's easier than storyboarding and far more immediate.

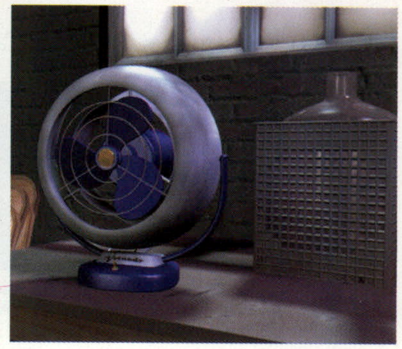
6. Build the set first – starting with the objects that are easiest to build. It gives you immediate results and encouragement (see picture below).

7. You'll need encouragement, support and feedback from your peers to keep you going through the dispirited times.

8. Setting a completion deadline and advertising the fact to your peers helps to discipline you.

9. When you come to record the sound, record it with as little distortion (reverb, stereo position and so on) as possible. It makes it easier to work with the audio afterwards.

10. You need to plan out your funding. No-one's going to pay you to do this kind of project so you must be self-sufficient.



seemed to have honest enthusiasm – and it harked back to my furniture-making desires to come up with the work but not to be physically responsible for mass-producing it."

Phil set himself the target of getting something ready in time for the Big Kahuna animation competition in California the following year. He went out and bought the latest full version of *Cinema 4D* and set to work. He freely admits that coming up with the original story was one of the hardest parts, especially as he didn't want to get into lip-synching and a multi-set storyline. Eventually, on a train on the way back from Scotland, his friend Jez came up with the idea of balloon characters. "The *Reservoir Dogs* warehouse scene fulfilled the requirements for a single atmospheric and versatile set, and from then on, the rest of the story just suggested itself."

It shouldn't happen…

Things to remember when it all goes pear-shaped

Things can easily go awry, but it's not the end of the world. You need to think on your feet, and be flexible. As Phil says, "I had to be adaptable – I left the sound until the last second, then got it badly wrong at first. I ended up building a soundproof 'box' made out of mattresses, blankets and anything else that would deaden the sound and remove the noise of the outside world. I created my effects by sticking my hands through holes in the blankets and squidging inflated balloons within the cube in time to the on-screen action! I was recording in the early hours, often in between the sound of planes landing at Heathrow.

"Another time, I built a huge 5MB texture map for the pump, a simple object that could barely be seen. It's easy to go over the top!

"At first, I was hugely ambitious, but as deadlines loomed and the realities of the situation imposed themselves, I had to scale down my ideas. The story was originally going to have a happy ending, but it would have taken another year to do.

"I looked at what I had and realised that it already achieved my original objectives, which were to make a competition piece which would also double as a creative showreel so that I could use it to get a job. So I drew the piece to a speedy conclusion. Now to see what happens next…"

We'll be watching with great interest.

> *"Sometimes it's not enough to talk the talk – you have to walk the walk too"*

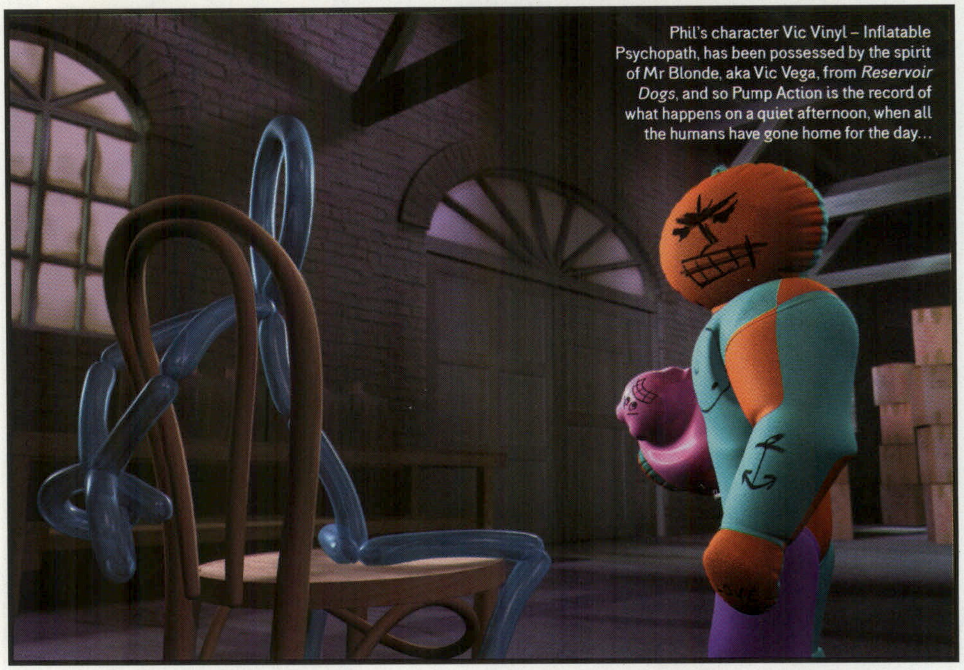
Total dedication

The eventual production took about 18 hours of work per finished second of animation, and Phil dedicated himself full-time to his movie, which took him 14 months to complete, which was eight months longer than he originally planned. *Pump Action* is currently in the final group of the Big Kahuna competition and looks set to win recognition at numerous other animation festivals too.

We asked Phil, even if he doesn't get a job as a result, has it been worth it? "Yes, because sometimes it's not enough to talk the talk – you have to walk the walk too. The project has changed me. I don't know if it'll get me a job at Pixar or ILM, but for me, the best thing about getting into the Royal College of Art was the letter saying I'd been accepted. Maybe this will be the same." ca▸s

Visit Phil's Website at **[w]** www.pump-action.co.uk, or contact him on **[t]** 020 7708 5091 or at **[e]** captain3d@pump-action.co.uk

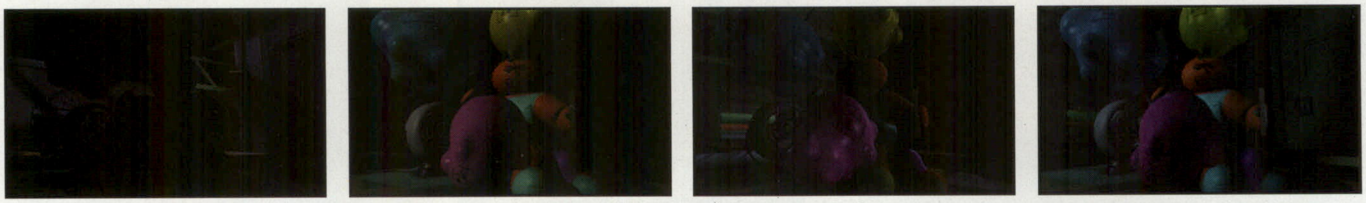
You can see a trailer of *Pump Action* on our cover CD.



Phil's character Vic Vinyl – Inflatable Psychopath, has been possessed by the spirit of Mr Blonde, aka Vic Vega, from *Reservoir Dogs*, and so Pump Action is the record of what happens on a quiet afternoon, when all the humans have gone home for the day…

Lights, cameras, action

How to recreate that authentic Tarantino atmosphere…

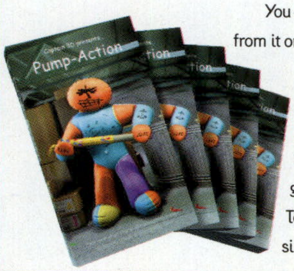


Phil is keen to point out that he's not a 3D lighting specialist, which he considers to be an art form in itself. However, he did specifically choose the *Reservoir Dogs* warehouse set for its moody lighting, complete with many stark shadows cast by skylights and high windows. Aficionados of the film may notice that Phil has attempted to duplicate the lighting precisely, although he has added some character spots to highlight the action.

Win Pump Action!

Enjoy the adventures of inflatable psychopath Vic Vinyl in the comfort of your own living room…

Phil is so pleased with *Pump Action* (and rightly so) that he's produced a videotape featuring the complete movie in all its glory. The tape also includes an extensive 'making of' documentary which provides a fascinating in-depth look at the planning, modelling, texturing, rendering and so on which went into the film. A joint project with Happy Ship, another two-man team who use *Cinema 4D*, it's an invaluable insight for budding animators.



You can see exclusive extracts from it on our coverdisc.

The tape normally costs £12.95 from Hisoft **[t]** 0500 223 660, but we've got five copies to give away courtesy of Phil. To enter, just answer this simple question.

What software was used to produce *Pump Action*?

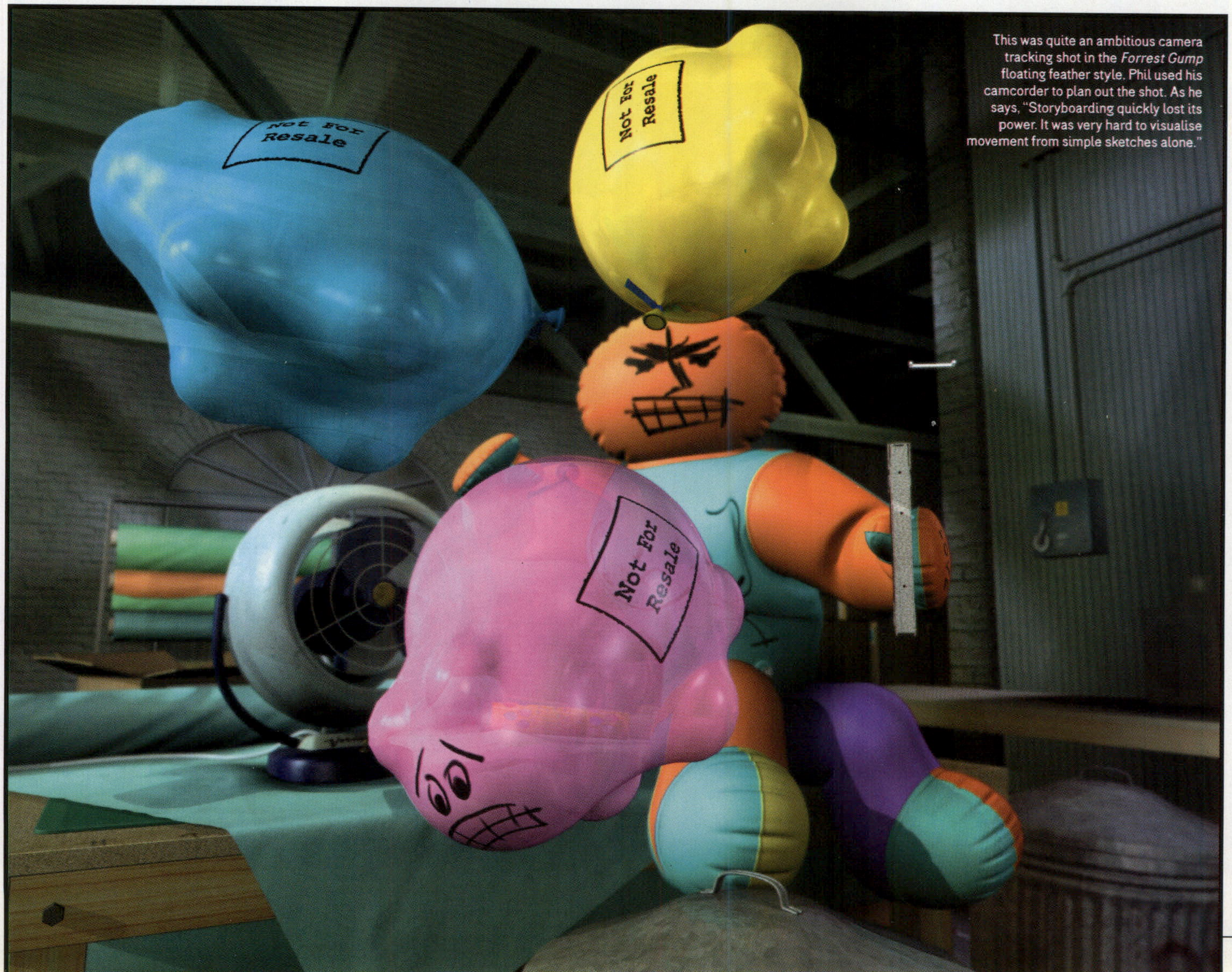
a) Cinema 4D
b) Video 3D
c) QuarkXPress

To enter, simply click the Current Compo button from the Computer Arts Special CD interface and enter *Pump Action* as the compo name. Then select your answer, fill in the other details and click Submit Entry.

If you're not on-line, write your answer on a postcard and send it to: *Pump Action* Compo, Computer Arts Specials, 29 Monmouth Street, Bath BA1 2DL. Please remember to include your telephone number.

The rules

The closing date for the competition is 31 June 2000. Employees of Future Publishing and any of their agents or families may not enter. Only one entry per reader. The editor's decision is final. No correspondence will be entered into and there is no cash alternative. No purchase necessary.



This was quite an ambitious camera tracking shot in the *Forrest Gump* floating feather style. Phil used his camcorder to plan out the shot. As he says, "Storyboarding quickly lost its power. It was very hard to visualise movement from simple sketches alone."

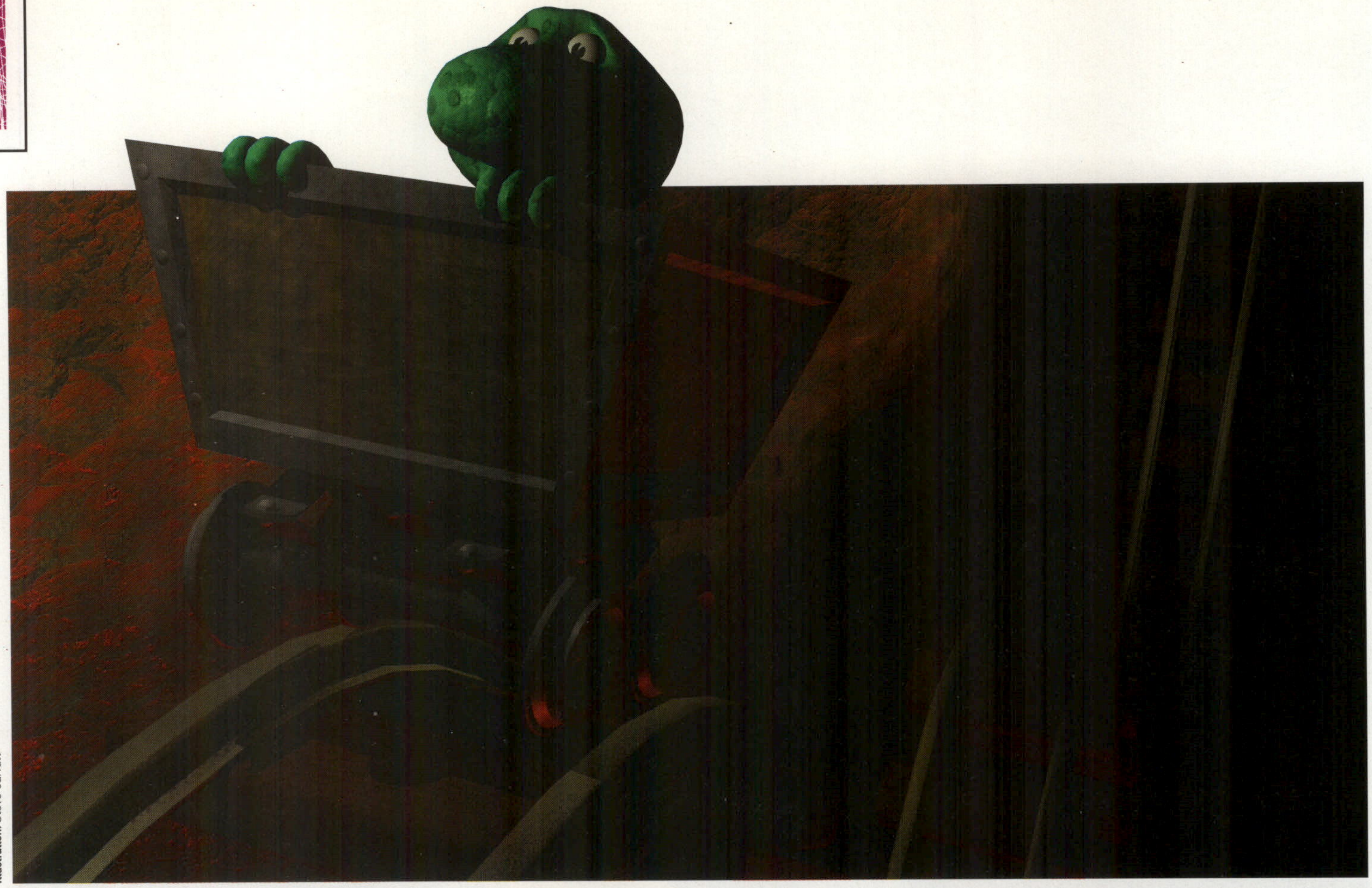
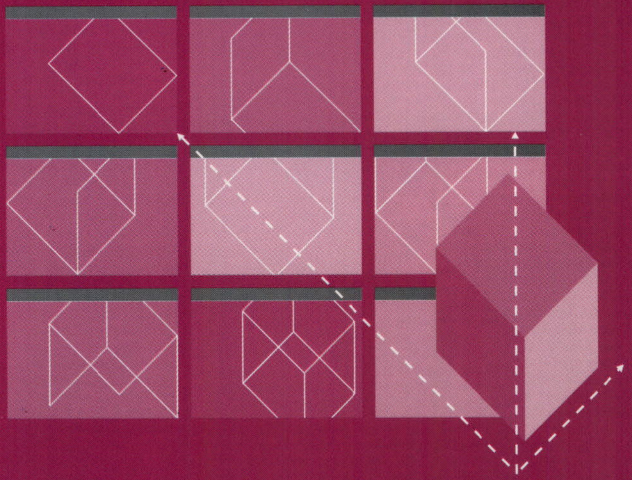


Illustration: Steve Jarratt

Modelling with Lightwave

Create this brilliant image with Newtek's premier league 3D package and our comprehensive tutorial



Anyone moving up to *LightWave* from a package like *Ray Dream Studio* or *Bryce* will be in unfamiliar territory. Many of the modelling tools are subtly different, moreover, *LightWave* has a completely different working methodology.

LightWave's modeller introduces the concept of layers – much like those in *Photoshop* – which allow you to work on individual sections of a larger model, cutting and pasting polygons, or groups of polygons between layers.

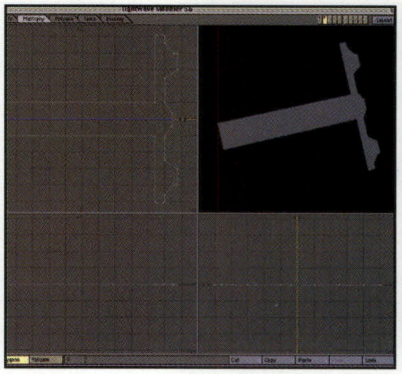
LightWave also allows you to apply surfaces to whole objects, selected areas, or individual polygons at will. So you can model a whole car wheel and have different surfaces for the tyre, the rim and the hubcap – all using a single model.

In this tutorial, we'll introduce you to some of *LightWave*'s modelling functions, and a few of its cleverer tricks. These aren't hard and fast rules, though – everyone models differently, and *LightWave* offers up many methods of achieving the same end result...

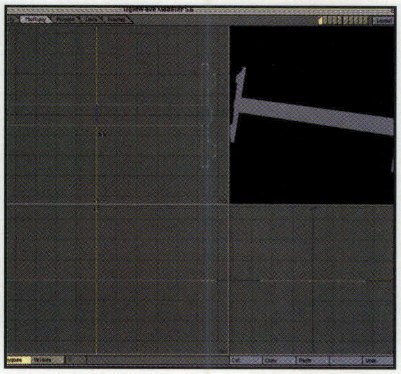
Credits
Expertise, words and illustration supplied by Steve Jarratt. For more info on *LightWave* visit
[w] www.newtek.com

Part 1: Building the wheels

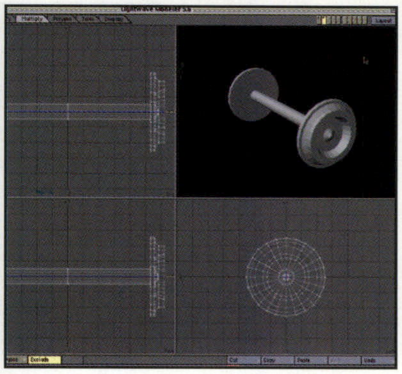
The first step is to employ *LightWave*'s Pen and Lathe tools and create the four wheels on our wagon…



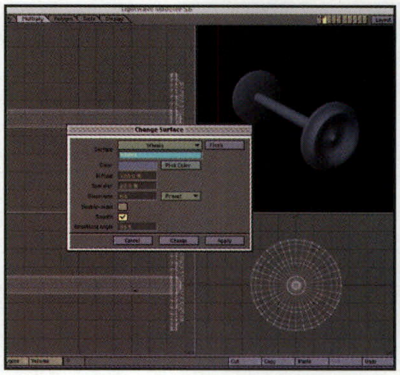
1 We'll start our wheels by drawing the outline using the Pen tool (Objects tab). To save time, just draw one half and then use the Mirror tool (Multiply tab) to make the other. Some points will be duplicated so Merge them (Tools tab), and then Merge (Polygon tab) the polygons into one.



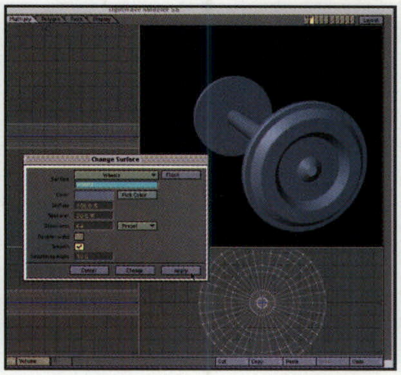
2 Again, use the Mirror tool to produce the left-hand side of the outline, merging points and polygons to create one single flat polygon. This process of merging helps to remove any excess data that *LightWave* simply doesn't need. Note also that we've built the wheels roughly to scale.



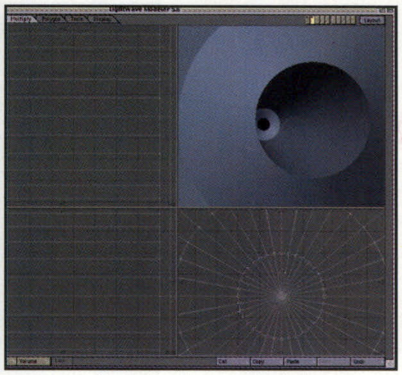
3 Select the Lathe tool (Multiply tab) and click on the Left view window. This will lathe the polygon along its X axis, which is what we need. The lathe line depends where you place the cursor – make sure it's on the X=0 and Y=0 axes (ie the centre of your model).



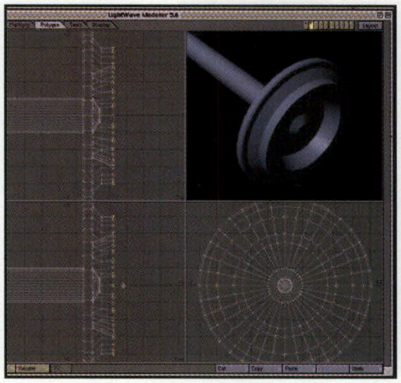
4 Now it's time to surface the wheels. Hit the [Q] key to bring up the Change Surface requester and enter a new name. Now alter the colour to a dull blue-grey, add a little specularity and glossiness, and smooth out those angular polygons. Ah – now that's not really what we want…



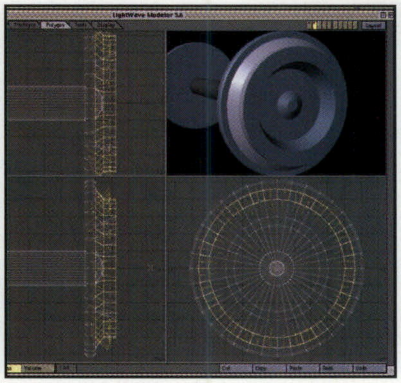
5 *Lightwave* has smoothed all the edges, including some we didn't need. To solve this, open up the surface panel again, and change the Smoothing angle to 30. Now only those polygons with adjoining angles of 30 degrees or lower are smoothed, leaving the bevels sharp.



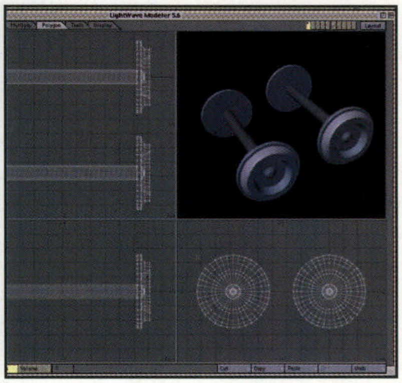
6 The Lathing operation has left an unsightly hole. To patch this, select every point on the offending circle, one after the other (you'll also select the points at the far end too, so deselect these). Hit the Make button (Polygon tab) to create a new polygon over the hole. Repeat at the other end.



7 Construction of the wheel is pretty much complete. However, the rim around the centre of the wheel looks a bit shallow. You can tweak that by selecting all the points that make up the rim in the Face view. Hit the Move key (Modify tab) and simply drag them along the X axis.



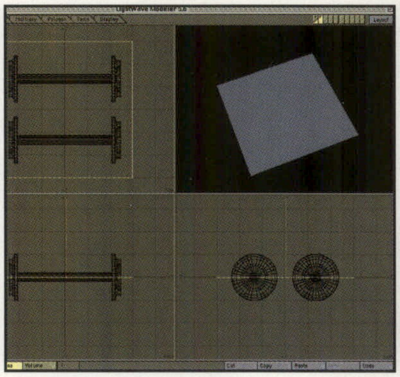
8 Now the wheels are all a uniform surface, but in reality the edges that touch the rails would be worn smooth and shiny. To change this, select every polygon that makes up this outer surface and then apply a new surface using the Change Surface panel [Q].



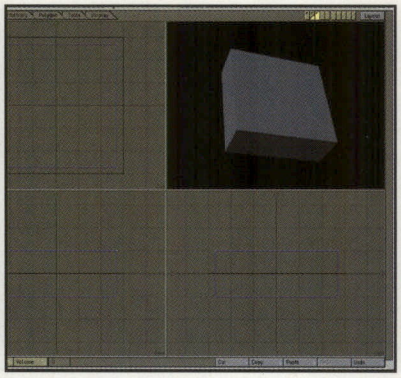
9 To finish off, copy [C] the wheels and paste [V] them into a new layer. Move the new wheels about 1.5 metres along the Z axis and then paste them back into the first layer. (If the wheels were going to rotate you'd need to save both axles and wheels individually). Save the model.

Part 2: Building the minecart

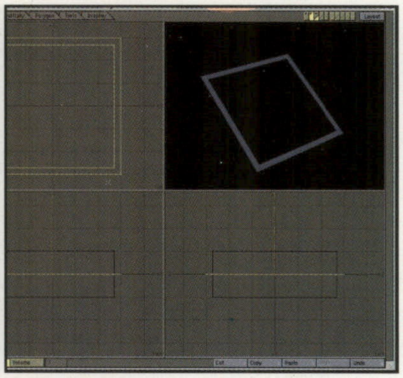
Next we'll utilise *LightWave*'s layering features to construct the minecart itself – no metalwork skills required…



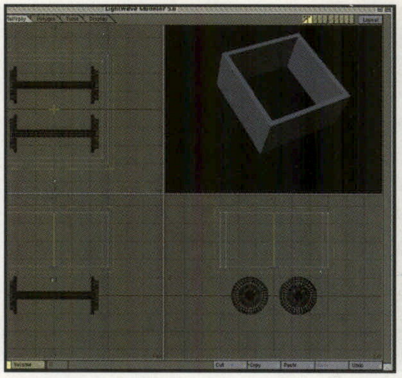
1 With the wheels still in Modeller, open a new layer, and then click on the lower half of the wheels layer button to display them as a black wireframe in the background. Draw a flat box, roughly the size of the topmost edge of the minecart. You don't need to add any depth to it yet.



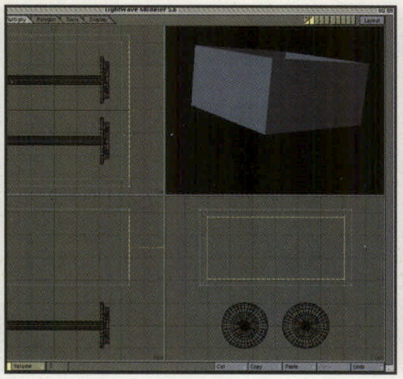
2 Open another new layer, and put the first flat polygon in the background. Draw a box slightly smaller than the first, and give it dimension on the Y axis. The actual amount doesn't really matter as long as it protrudes above and below the first polygon.



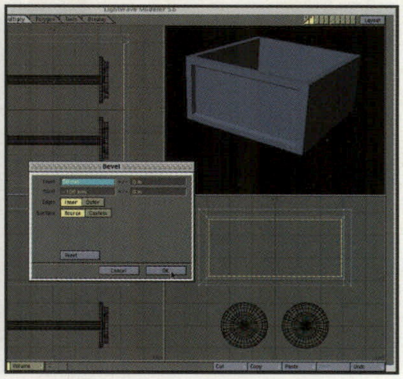
3 Switch layers so the box is in the background and the flat poly in the foreground. Now use the Boolean command (Tools tab), set to Subtract. This will create a flat, rectangular polygon with a hole in it. Merge points and remove any excess polygons using the cut [X] command.



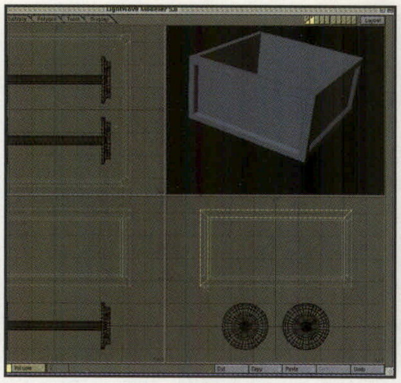
4 With the wheels in the background layer, Move the flat poly about 1.8m above the wheels. Activate the Extrude tool (Multiply tab), and click in the Top view window to extrude on the Y axis. In the Front view window, pull the Extrude cursor down about 1.5m, then hit Return.



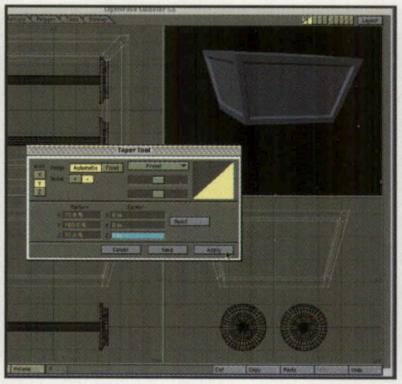
5 Select the sides of the box, and use the Bevel tool (Multiply tab) with an Inset of 100mm and a Shift of 0. This will create a new polygon slightly smaller than the side of the box, plus four adjacent panels. (You can perform the same task with Smooth Shift of 0 and the Stretch tool).



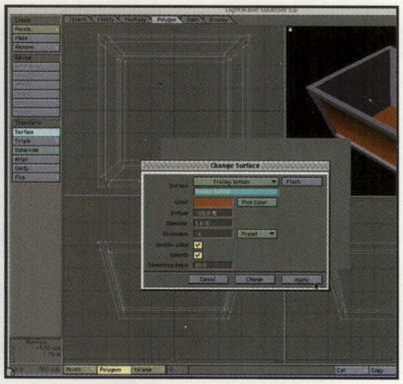
6 Now perform another Bevel, with an Inset of 50mm and a Shift of -100mm. This creates a proper bevelled surface sunken into the sides of the cart. To reduce the overall uniformity, you could do each side separately with slightly differing values.



7 The four extra panels that were generated on each side with the first Bevel command can be Merged into one. Select each of the four panels on one side, and then Merge using [Shift-Z]. Now do the same with the three other sides. There – you've removed 12 polys you didn't need.



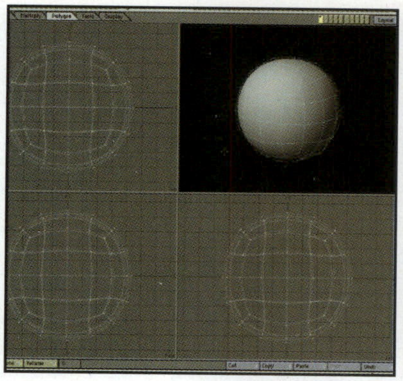
8 Apply a taper to the box, using the Taper tool (Modify tab). Use the following settings: Y axis, Automatic Range, negative (-) Sense. Change the Factor values to X 72 per cent, Y 100 per cent, Z 72 per cent, but leave the Preset and Centre values alone.



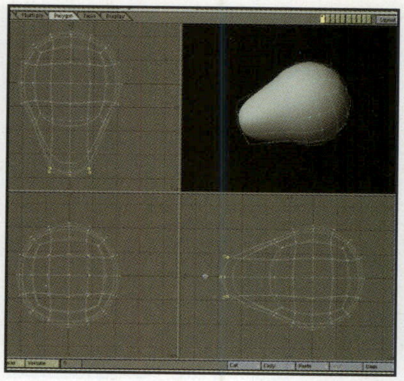
9 Make a new floor by selecting the bottom four points on the innermost frame, and hitting the Make button (Polygon tab). Select the floor and inserts and give them a new surface, then use the Invert button (Display tab) to give the remaining polygons a different surface. Save the model.

Part 3: Building the creature

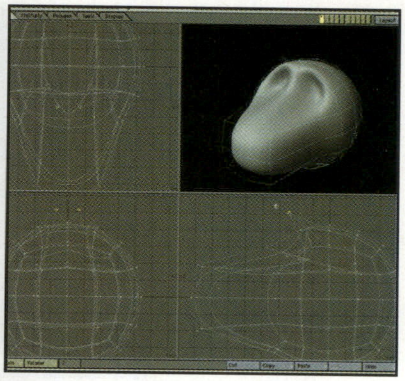
Now to bring our hapless green passenger to life – with a little help from *LightWave*'s MetaNURB commands…



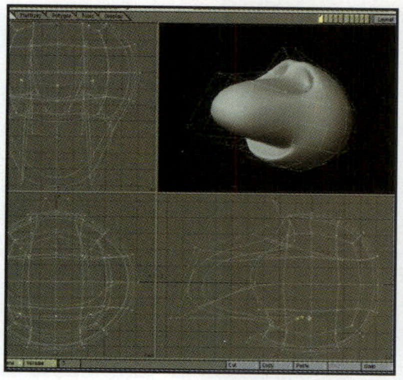
1 To begin, make a standard Box (hit [Shift-X], then [N] and click OK). Now click on Subdivide (Polygon tab) and click on Metaform, and then OK, and then do it again. You should end up with an angular kind of sphere. Now hit the [Tab] key to change this into a MetaNURB shape.



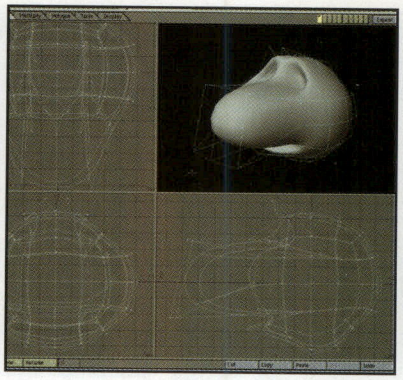
2 Sculpt the creature's head by selecting points on the MetaNURB cage, and moving them (use the [T] button to bring up the Move cursor). Start by selecting six points in the Face view window (deselect the points at the back) and pulling them into a nose shape.



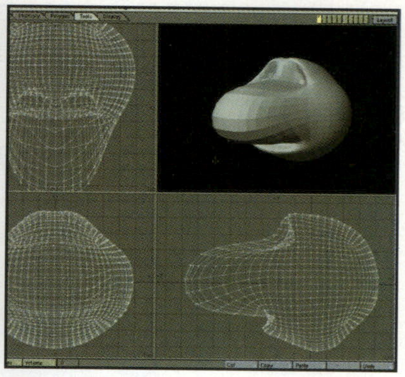
3 In the Left view, choose three points at ten o'clock and drag them back to make eye sockets. Drag the centre point back and up to make the bridge of the nose. By pulling the top two points upwards and inwards (Stretch command) you can give the eye sockets a worried expression.



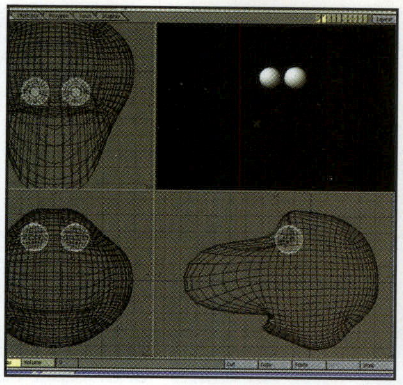
4 Now choose a few points under the end of the nose and drag them way back to form the mouth. With all of this you'll need to experiment – thankfully LightWave has multiple undoes – and tweak individual points to get the shape you need.



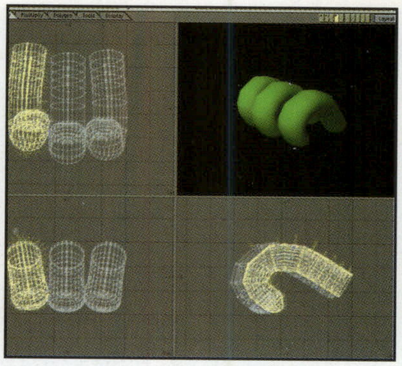
5 To finish off, make the end of the nose a bit more bulbous, give him some chubby cheeks and shape a small neck. You won't see the head and neck in close-up, so this doesn't need a lot of work. Just in case, make a rough body shape using a new MetaNURB object.



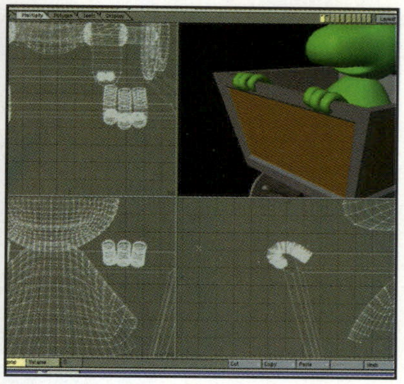
6 Once you're happy with the overall shape, hit the Freeze button (Tools tab), to create a smooth, multi-polygonal mesh. It looks very blocky here, but apply a suitable surface with Smoothing turned on and it'll look fine.



7 Create a small ball [Shift-O] and then copy and paste it into another layer. With the head in the background you can position each eyeball at will. Give them both different surfaces, because you'll need to apply texture maps separately. Paste them into the head itself and tweak to fit.



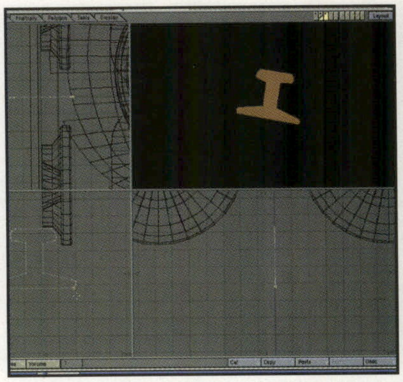
8 For the fingers, make a Ball, and Knife it just off-centre. Select one half of the ball and Move it to form a long sausage. Divide the centre polygons using the Julienne plug-in (Object tab> Custom). Bend the finger using the Bend tool (Modify tab). Duplicate it twice and shrink the two outer ones.



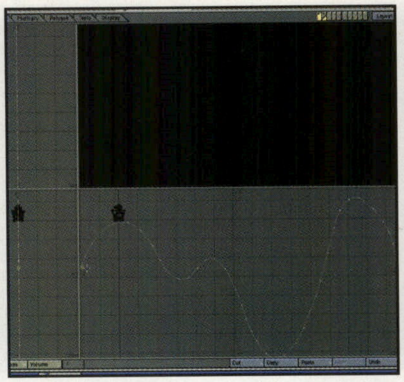
9 Open the minecart and paste the fingers into place on one side. Select a few polygons in each, then use the Select Connected tool (Display tab) and Mirror these over to the other side. Place the wheels, minecart, fingers and creature all together in one layer and save the model.

Part 4: Building the track

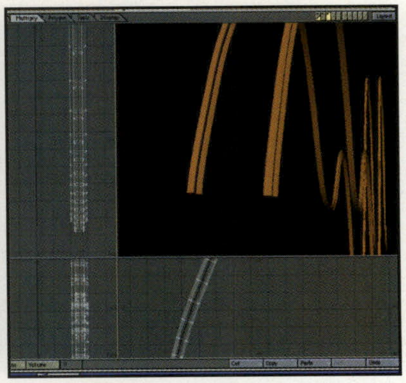
Finally, we'll lay the sleepers and track for our mineshaft railroad and put the whole scene together. Wagons roll…



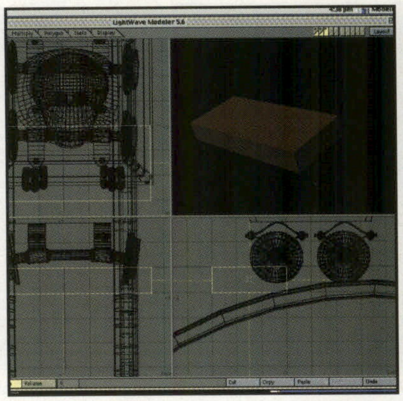
1 Open the minecart/creature model and put it in the background. Using the wheels as a template, draw a cross-section of the rail track using the pen tool. Give it a new surface, then cut and paste it into a new layer. Move this outline into position under the other wheel.



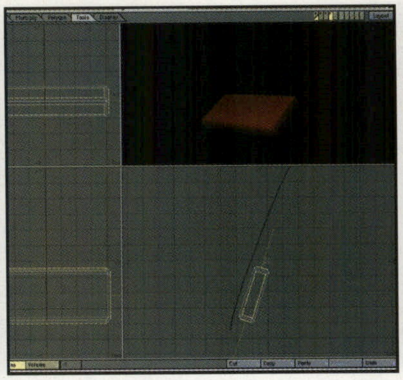
2 With the minecart/creature model still in the background, shrink the view windows down using the [<] key. Make the Left view window bigger if you need to. Now starting at the far left, draw a rollercoaster curve with the Sketch tool. Move individual points to smooth it out if necessary.



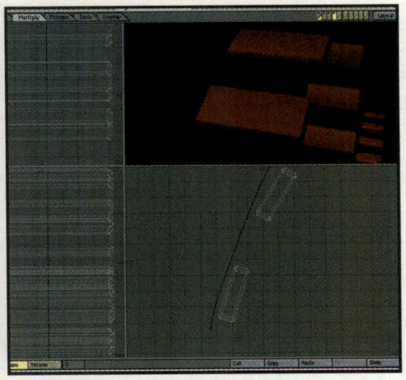
3 Place this curve in the background and have the rail template in the foreground. Place the rails at the left hand end of the curve, and Rotate them (Modify tab) so that they're perpendicular to the curve. Now click on the Rail Extrude button (Multiply tab). Use the Automatic setting and click OK.



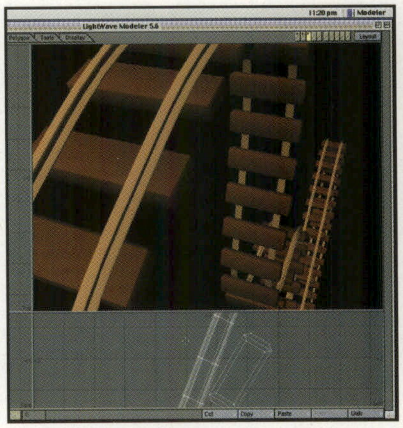
4 Using the minecart and track as a template, draw a long thin box, about 1.5m wide by 4m long and 0.5m tall. Give this a suitable surface. This will be the template for the sleepers, however it's a bit too angular and precise.



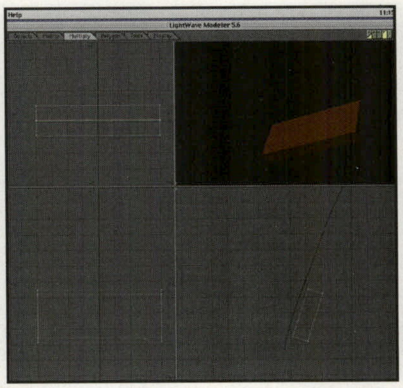
5 Select the four outer edges and give it a slight bevel using the Bevel command (Multiply tab). Now when we click on Smoothing in the surfaces panel, *LightWave* will take the sharp edges off it. Take your sleeper and place it under the curve (again use the rail as a template).



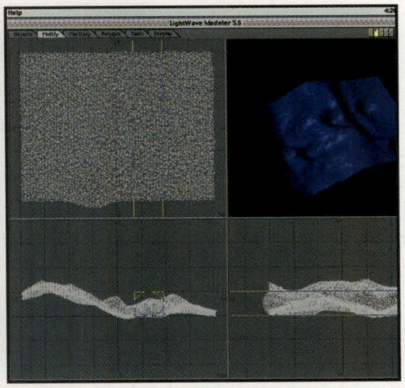
6 Click on the Rail Clone button (Multiply tab), and then select Uniform Lengths and leave Oriented checked. The number of sleepers you need depends on the length of your curve – start around the 50 mark and if the gaps are too small, Undo it [U] and use a smaller figure.



7 With the rail and sleepers constructed, all you need to do now is line them up (they should be pretty close already), and then cut and paste one layer into the other. Save this model.



8 The finishing touch to the minecart is a some leaf-spring suspension. This consists of a thin disc, stretched into a flat sausage. This was Julienned and bent into shape with the Magnet tool (Modify tab). The bolts are just hexagonal tubes with hemispheres Booleaned on top.



9 The mine wall is a large flat polygon, broken up into multiple polygons using the Subdivide and Triple tools (Polygon tab). Jitter gives it a random surface and the Magnet tool is used to create large indents and outcroppings. Now it's a simple matter of putting it all together in Layout!

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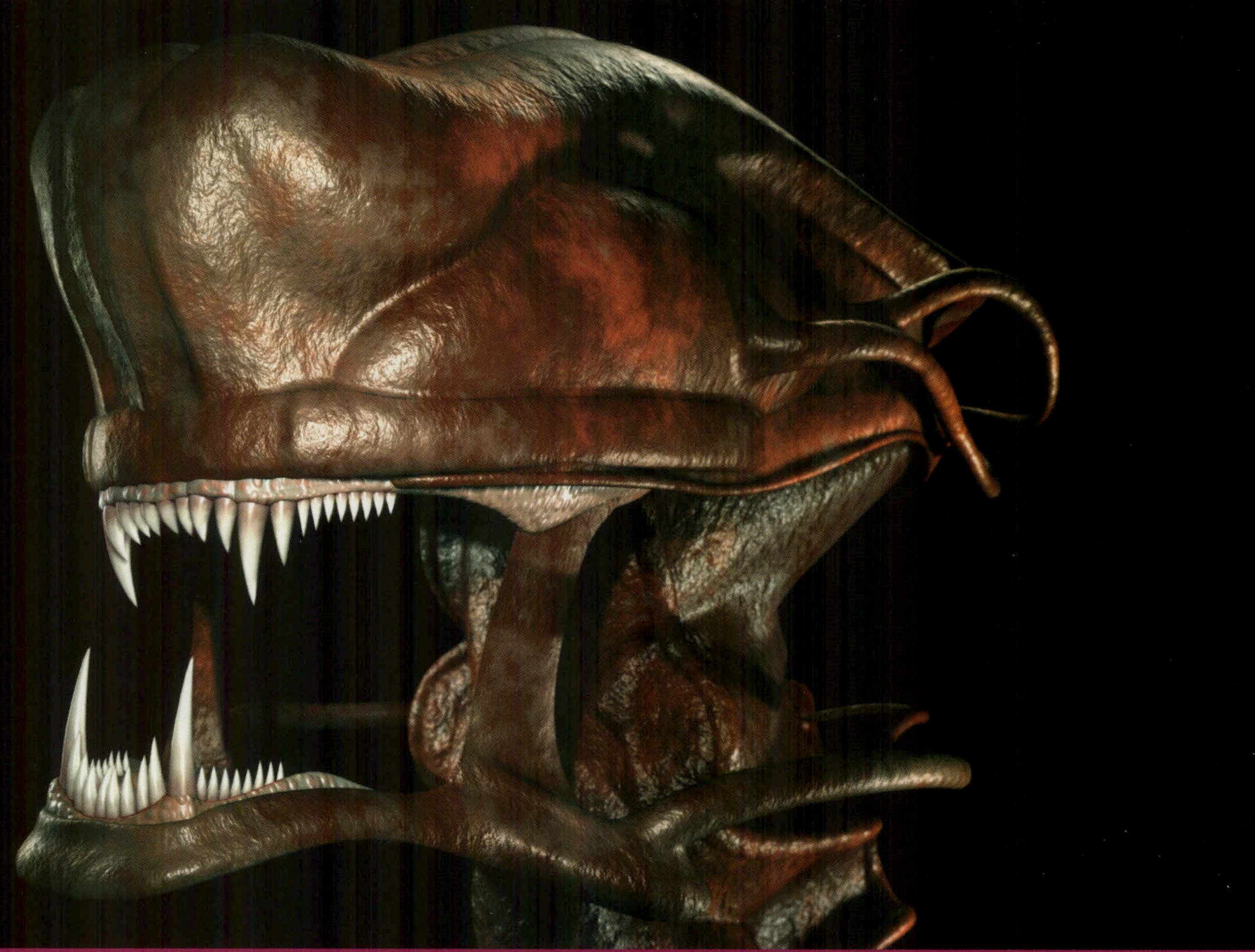
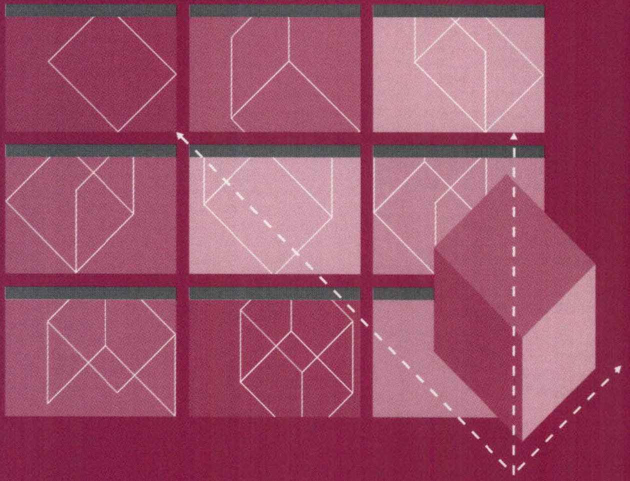


Illustration: Simon Danaher

Model an alien in *Maya*

Thanks to a vast array of modelling tools, you can create this fearsome intergalactic creature in *Maya* by following our walkthrough…



Maya is one of the best NURBS modellers available. It boasts an impressive set of industrial strength tools for creating and controlling surfaces but it's not as difficult or unapproachable as you may think.

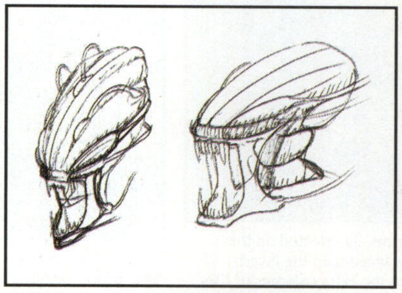
We've used *Maya Unlimited*'s advanced modelling tools to create this alien head, and you can see exactly how it was done by following our tutorial over the next five pages...

Loving the alien

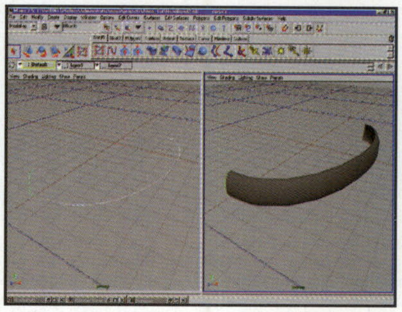
Words and expertise supplied by Simon Danaher **[t]** 01633 253 028 or **[e]** simond@naher.demon.co.uk

Part 1: Getting started

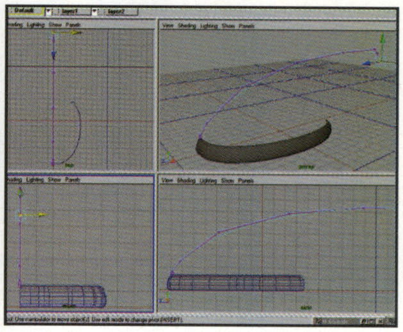
Our alien begins life as a humble sketch, before we get to grips with *Maya*'s extensive modelling tools and start creating the creature's head



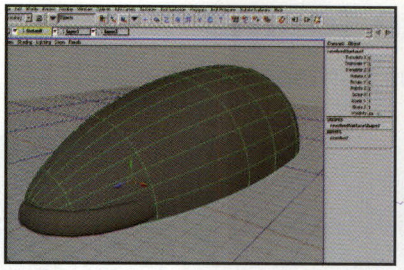
1 The first thing we did was to sketch the idea with good old paper and pen. This helps to get an idea of the form and sort out the design before building begins. There will be alterations along the way but making sketches first will reduce much of the guesswork.



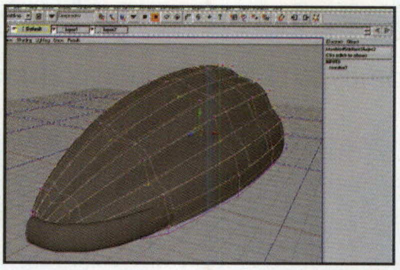
2 It's often hard to know which part to start on, especially on our alien which has a lot of interconnected parts. We decided on the band above the mouth which is created from a simple extrusion along a curve, as seen here.



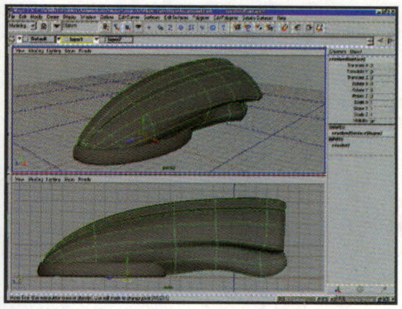
3 Next the lateral head profile curve is drawn using *Maya*'s NURBS CV curve creation tool. *Maya* has two curve drawing tools, Control Point and Edit Point. The EP tool will come in handy later.



4 The curve is then Revolved (Lathed) 90° about the z axis to create the beginnings of the head surface. The Channel Box at the right of the screen can be used to edit the result of most operations. Here you can set the revolve angle and number of spans (sections) the surface has, as well as the Revolve axis and Degree of the surface.



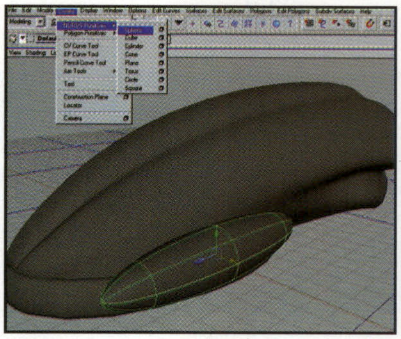
5 Our alien has a fluted head which can be easily created by editing the Revolve's CVs (Control Vertices). The pink lines connecting the CVs are called Hulls. Clicking on a Hull selects the entire row or column of CVs it connects. This makes it easy to select the correct CVs and for us to move them in y to create the corrugated shape.



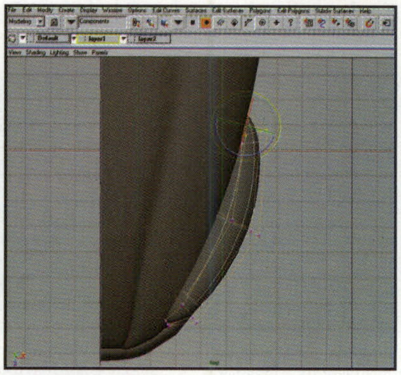
6 In case you haven't noticed already, we are only building half the head. The other side can be duplicated later. For now though, we continue to move CVs to shape the head. We can't really do much of this until more of the head is built, though.

Part 2: Adding the side lobes

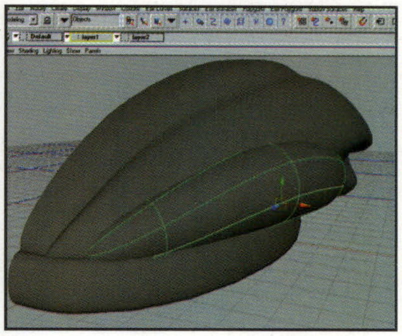
Let's face it, no alien is complete without his side lobes, which are created from a Sphere primitive. *Maya* makes it easy to translate, scale and rotate objects.



7 The side lobes are created from a Sphere primitive. It is rotated 90° in x so that the poles of the sphere are pointing in the correct direction. It is then scaled in z. *Maya*'s on-screen manipulators make it simple to translate, scale or rotate objects and CVs on any axis.



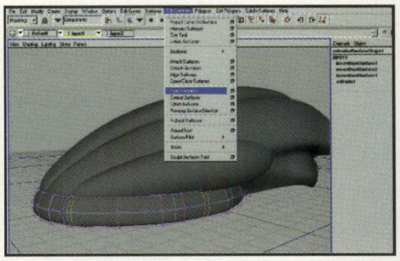
8 The sphere is deformed so that it curls around the head surface conforming to its shape. This is done by selecting groups of CVs at a time and moving and rotating them in Top view.



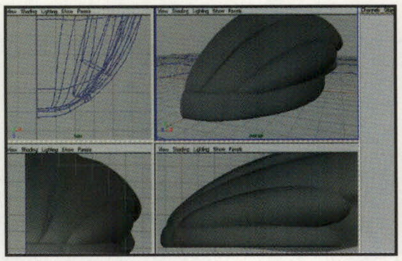
9 In the Perspective view, more shaping of the sphere is done to really make it fit the head surface. Groups of CVs were scaled along the x and z axes to further shape the lobe and a little bit of twist to the front helped tuck it into the gap between the head surface and the extrude.

Part 3: Modifying the extrusion band

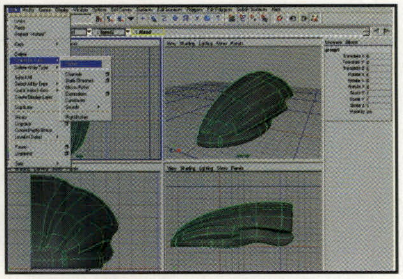
Now we'll start shaping the alien's head and creating some tighter curves



10 Once the side lobe is in place, we can start to shape the extruded surface below, so that they look like they belong together. To create tighter curves we need more rows of CVs. This is not a problem, we can insert extra geometry into the surface without changing its shape using the Insert Isoparm command.



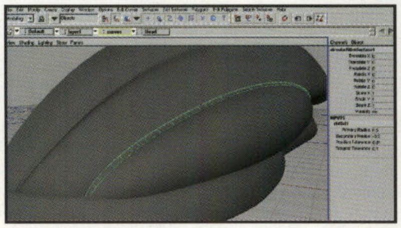
11 Four vertical Isoparms are selected on the surface (the yellow lines) then the Insert command is used to add the extra columns of CVs. These don't appear where the Isoparms were though, but it's simple to select and move them where you need them. Here we've added a crease that continues a line from the lobe.



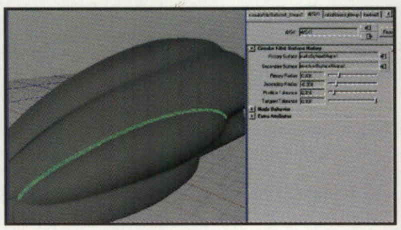
12 Though we haven't used it much, we have been modelling with Construction History active. For the next step we'll remove the History and save the head as a new file. This way we can always come back to the History-enabled version if we need it.

Part 4: Adding fillets to smooth the seams

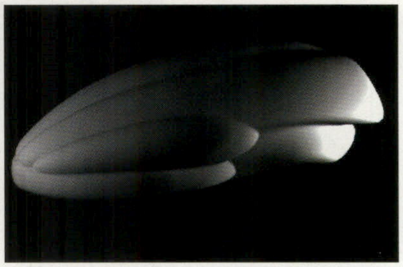
Maya's Surface Fillet feature comes to the fore as we continue to shape the alien



13 To smooth over the seams and to make the different surfaces seem more like a single object, we'll use *Maya*'s Surface Fillet tool. First you need to select a pair of surfaces between which you want to create the fillet. Surfaces must also intersect of the command will fail. Here's the first fillet (with the Secondary Radius set to a negative value so that the fillet appears on the outside of the head).



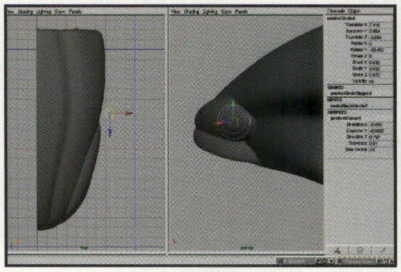
14 With *Maya*'s construction History, all operations remain 'live' and affect subsequent operations you perform. The surface fillets, for example, will try to stay connected to each object, even if the object's shape changes. Here in the attribute editor you can see the Surface Fillet 'node' (rbsrf1) and its controls. These can also be changed at any time if necessary to change the fillet.



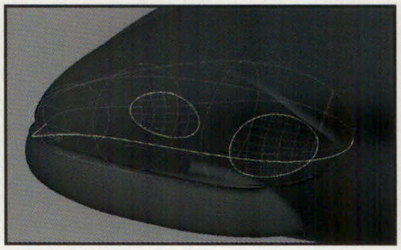
15 Here are the fillets applied to each object pair. Fillets can be problematic, especially when it comes to animation. It's always advisable to remove their History after you are happy with them. Animating any object with History is asking for trouble anyway.

Part 5: Trimming

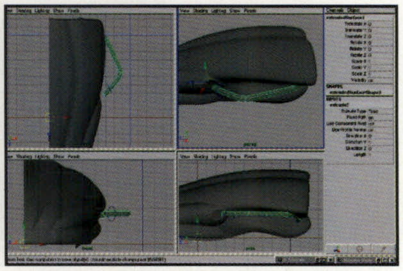
Trimming is a great way to extend surfaces and add detail to your model



16 Trimming is for creating holes which can be used as points of attachment for additional surfaces. Here a NURBS circle is being projected onto the lobe object from the current view's perspective. The purple circle is the projected Curve On Surface.



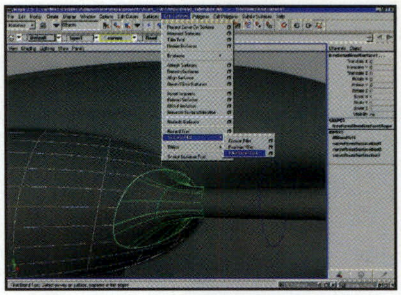
17 Once a Curve on Surface has been created you can use it in Trimming the surface. After selecting the Trim tool, the object is displayed in a dotted white wireframe, and you are prompted to select the portions of the surface you want to keep. Shift click to select multiple areas, the rest is trimmed and disappears.



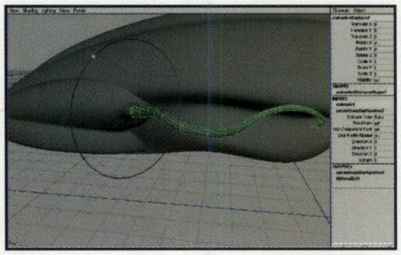
18 A trim is not destructive, the trimmed portion is really just hidden. It can be untrimmed later. To create the tube that extends from the lobe, a curve is created in top view. The original projection circle is duplicated and scaled down and then extruded along the curve.

Part 5: continued

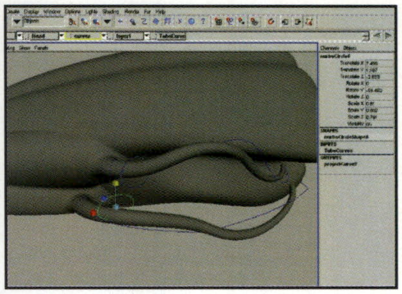
Experience the power of *Maya*'s Fillet Blends as we attach the new tube object and edit it using the package's useful Construction History feature



19 *Maya*'s Fillet Blends are really powerful. We can attach this new tube object to the lobe object using a blend. The trim edges and end Isoparm of the tube are selected in turn and the blend is created between them. The result looks like one continuous, fluid shape.



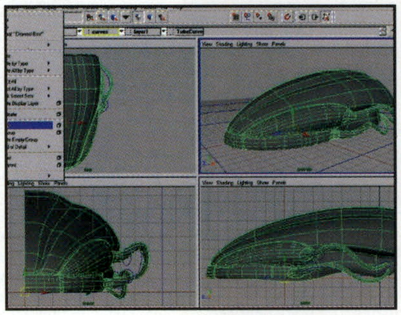
20 Because of Construction History we can go and edit the extruded tube with the blend in place. By selecting the Extrude node in the Channel box and typing the [T] hot key we can access some addition manipulators for the Extrude that control the scaling and twist of the extrusion. Clicking on the manipulators and dragging causes the extrusion to change in real time, and the blend updates too.



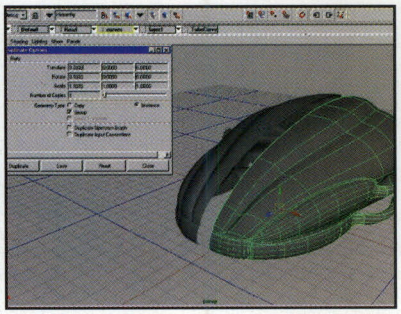
21 Another tube is attached to the band object below using exactly the same methods above. By scaling both the trim curves and the extrusion profile we were able to fatten up the tubes a little more. Once you've got used to working with Construction History, it's hard to go back.

Part 6: Instancing the geometry

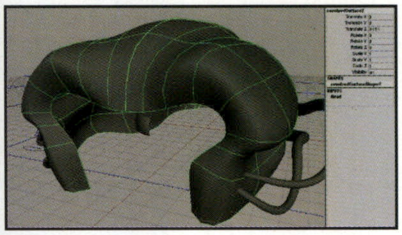
Our alien needs a hole in the head, like a hole in the head. So we'll fill it in. In this section we'll also use the instancing features to make changes to both sides of the alien's head



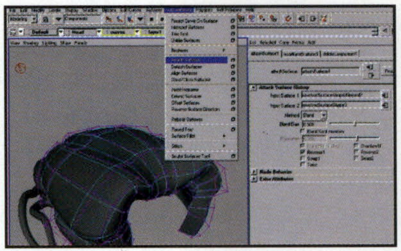
22 Again we'll save the scene then delete the History and resave with a different name. All the head surfaces are selected and then the Edit>Group command is used to create a single group that can be selected easily.



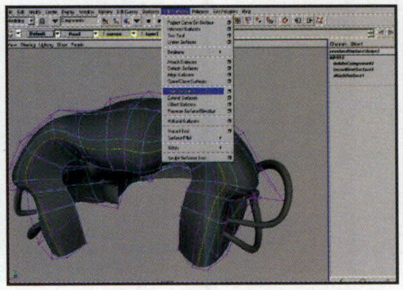
23 In the Duplicate options box the geometry type is changed to Instance. Now when the head is duplicated the copy is simply a reference and not a discrete object. To make the duplicate group a mirror image, its X scale was set to -1.



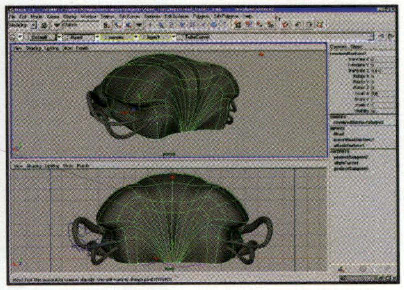
24 Because of instancing, whatever changes we make to the original objects within the head group are reflected (literally) on the opposite side. In this way symmetry is maintained, and with this in mind we decided to modify the back of the head. However, in order to get a smooth join and close the gap we would have to use the Align Surfaces command, which only works between two discrete objects.



25 We must back up a few steps and delete the instanced group. This time everything except the head surface and the extruded band are grouped, then instanced to the other side as above. The remaining objects can then be duplicated as real geometry. The two head surfaces are selected, then the Attach Surfaces command is selected. This joins two objects along an edge and creates a single surface.



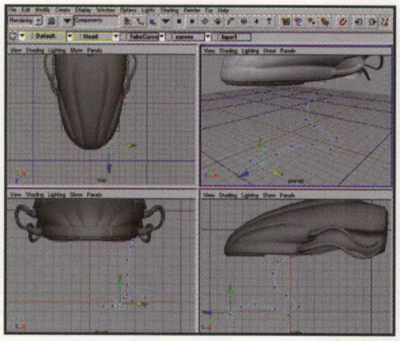
26 To fill in the hole at the back we need to add some extra rows of CVs. Right-clicking on the surface pops up a marking menu allowing you to select different components (CVs, Hull, Isoparms etc). A single Isoparm is selected and the Insert Isoparm command used to add the extra row of points.



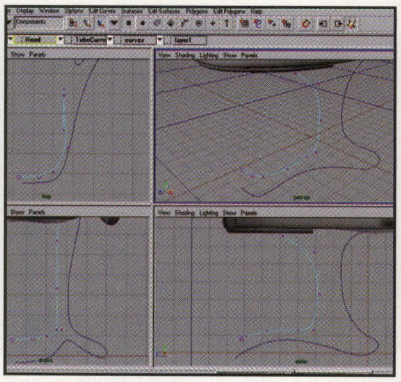
27 Now we can select Hulls in turn and fill in the hole by scaling them down. The last Hull has been scaled to zero in y and z so that all the points lie on a line. It has caused some stretching but at least it's at the back. To draw attention away, a hole was created by trimming the surface and lofting between curves and the trim edge.

Part 7: Making the jaw

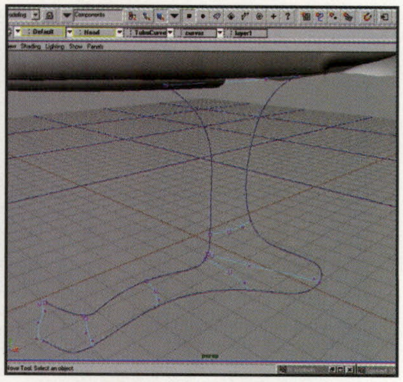
Now the alien's head is really coming together, and it's time to model the jaw, by creating some curves and using the Birail +3 tool



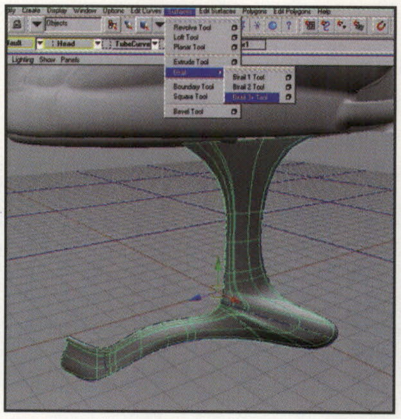
28 The first step in creating the jaw is to decide how it will be made. Options include sweeping profiles along two rails curves, moulding a primitive or patching several surfaces together. We begin though by drawing curves that roughly define its shape. Here is the outer edge curve which is drawn in side view then edited in perspective to get the right shape.



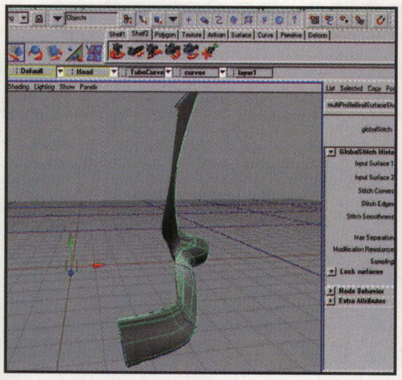
29 The inner curve is created the same way, here viewed in Component Edit mode so you can see the CVs. We can now either create curves between the two 'rails' and make a series of surface patches using the Boundary surface tool or create a profile curve and sweep it along the rails.



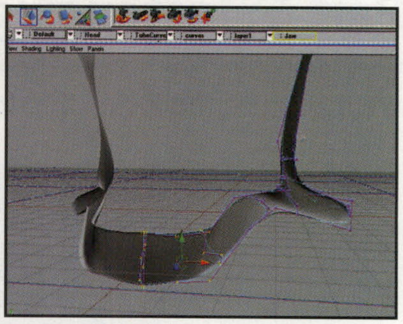
30 We decide on a Birail Sweep for simplicity so the profile curves are created next. In order for sweeps to work the endpoints of the curves must be attached to the rails. *Maya's* excellent snapping makes this easy. By holding down the [C] key you can snap any selected CVs to another curve.



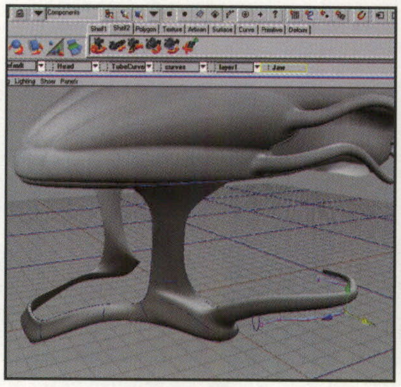
31 The Birail 3+ tool allows you to use any number of profile curves. This makes it easy to define exactly the shape of the sweep at the most critical points. Here is the first part of the jaw completed.



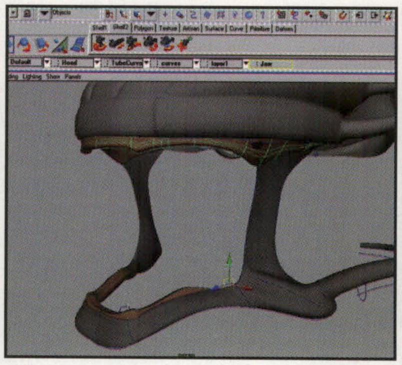
32 That's the outside done, and the inner surface is created in a similar way but using three simpler profiles. To join the two halves we use *Maya's* Global Stitch tool. This welds the two surfaces together and creates continuity between them for a smooth join.



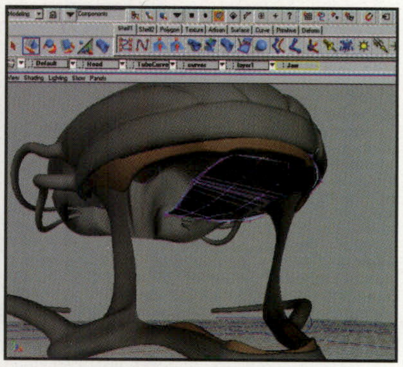
33 The Jaw is instanced and mirrored in z to create the other side for checking. The jaw doesn't meet at the chin, but we can fix that by editing the curves. With all the jaw curves selected groups of CVs are marqueed and moved. However, this has caused the outer surface to disappear. Not to worry, this would occur if one of the profile curves loses contact with the rails, a likely occurrence when moving CVs.



34 A quick check reveals the offending curve which is quickly reattached. The surface pops back into existence thanks to the Construction History. Once all the edits are done a tube like those on the head is added to the jaw using a trim and a surface to surface blend.



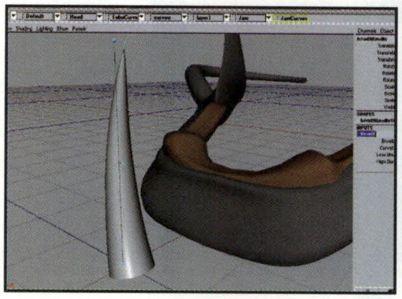
35 The gums are next added to the model. They are created from curves extracted from the lower jaw and the band extrusion. Profiles are swept along the extracted curves ensuring a snug fit between jaw and gums. Then the extruded objects are instanced, mirrored and the CVs are tweaked to suggest bulges where the teeth attach.



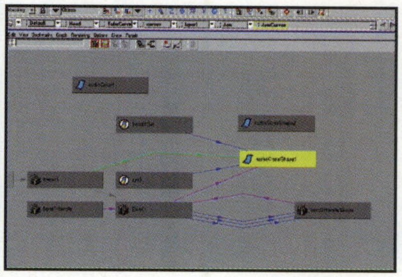
36 A palette is created for the inside of the mouth by lofting between a curve drawn along the world z axis and an Isoparm of the band extrude object. The shape of the curvature of the palette is controlled by moving the CVs of the z axis curve in y. The palette is mirrored to the other side and stitched to the original.

Part 8: Grit your teeth

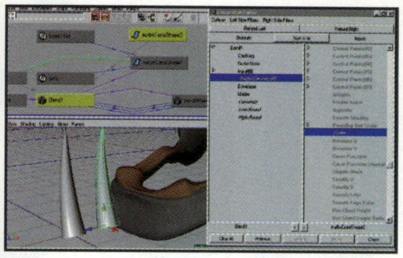
Time for a spot of dentistry. Thanks to *Maya*, we don't need to model each alien tooth individually – instead we'll make a master tooth and duplicate it



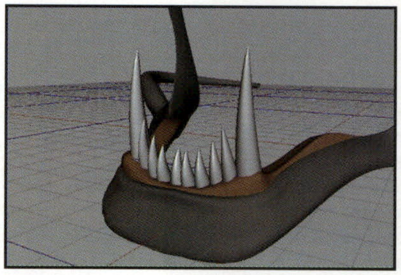
37 Rather than create the teeth one by one, we can make a master tooth and duplicate it. A NURBS cone primitive is created and deformed using a Bend deformer. The two are moved to a convenient location in front of the head so they can be easily seen and edited.



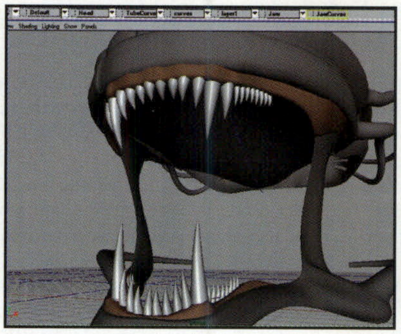
38 The tooth is duplicated using the simple Copy option. We'll now delve into the guts of *Maya* and connect the Bend deformer to the copied tooth. Here you can see the Nodes that make up the two Cones in the Hypergraph. We want to make another connection from the Bend1 node to the nurbsConeShape2 node.



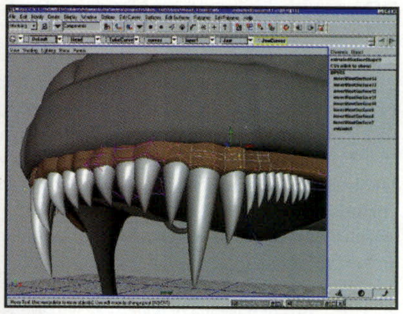
39 Middle click-dragging from the Bend1 node to the nurbsConeShape2 node opens the Connection Editor with the each node's attributes listed. The Output Geometry attribute of the Bend node is linked to the Create attribute of the cone. Now when the Bend deformer is edited both cones are affected, yet we can edit the CVs of either independently.



40 The tooth is copied to the other side, then it is multicopied to create 8 duplicates in a row in the x direction. By grouping them we can scale the group to make the smaller teeth in the middle of the jaw. Another Bend deformer is used to curve the group. Then each tooth is moved and scaled a little to add randomness.



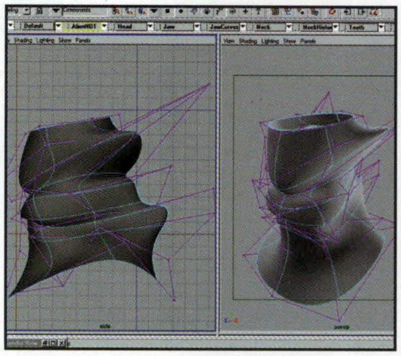
41 More teeth are added by duplicating the front group and then modifying the members to stop it looking too regular. The gums are also tweaked to add bulges where the teeth are.



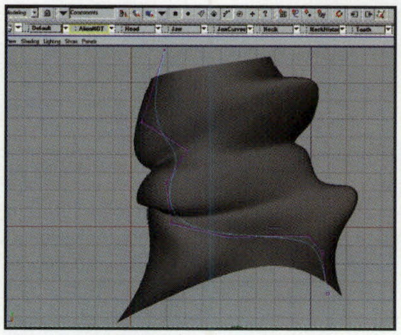
42 Where possible extra isoparms are added to the gums so that more detailed shaping can be done. This sort of editing can be tedious but it's the only way to get detail into the model, plus it makes the teeth look even more scary.

Part 9: The neck

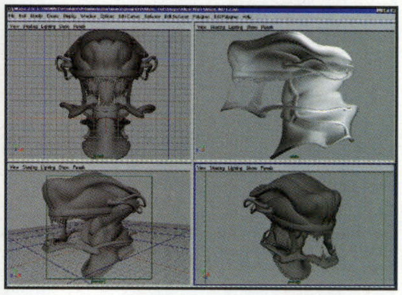
The final step – modelling the creature's neck. We'll lathe a curve and edit the shape. Then it's time to put the whole thing together



43 For the neck we first Lathed a curve then set to work editing the CVs and Hulls until we were happy with the shape. Moving CVs beyond the positions of neighbouring Hulls creates the deep folds on surfaces with few spans.



44 A curve was drawn in a side view to be projected on the neck. To add more detail to the surface we decided to trim it, and for the trim to work the curve has to extend off the edges of the surface (or be a closed curve fully within the surface boundaries).



45 The neck was then split in two by duplicating the neck and trimming opposite sections. The front part was moved away and scaled so that a surface blend could be used between the two trimmed neck parts. We decided to make a few changes to the design at this point, but thankfully *Maya*'s flexibility meant that the head could be reshaped very quickly.

How to get a job in 3D

Revealed: everything you wanted to know about breaking into the 3D computer graphics industry but were afraid to ask...

To an outsider, the world of professional 3D computer art can seem frustratingly out of reach. That there are too many designers chasing too few jobs means each new post within the industry is fiercely sought after, and to make matters worse, it can be impossible to judge exactly which jobs are suitable and how to best apply for them in the first place.

Applicants should breathe easy. There are no mystical rites of passage or Catch-22 situations dictating those without a current job in the industry won't be considered. All you need is an understanding of the way the role of 3D designer has become so highly specialised. Each brand of 3D design, be it film and TV effects, multimedia, product design or more traditional CAD work, requires a particular set of skills. Some rely on basic artistic talent, others a working knowledge of particular software, most something in between. *Computer Arts 3D Special* talks to industry figures in each of the major design fields, and reveals just what employers are really looking for, and how they judge who has what it takes to be a 3D professional...

If you can regularly produce images such as this one from Real-Time Visualisation, you're on the way to getting a job in the 3D industry.

Film & TV effects

When it comes to the glamour end of the 3D business, it's vital to make a good first impression – you might not get another chance

Of all the careers in 3D digital design currently available, the world of film and TV special effects is the one with real sex appeal. For better or worse, there's a perception that this is the glamorous end of the business, with designers rubbing shoulders with hot movie industry types and getting their finished work up on the silver screen, or at the very least piped through to millions of cathode-ray soaking couch potatoes.

Whether or not the reality matches this image is a moot point, but there's no doubting that this perception means more and more people are chasing every vacancy. So when you're applying for a job, the fight to get noticed will be that much more difficult. First impressions clearly count, and so a well-prepared showreel to accompany that CV is absolutely vital.

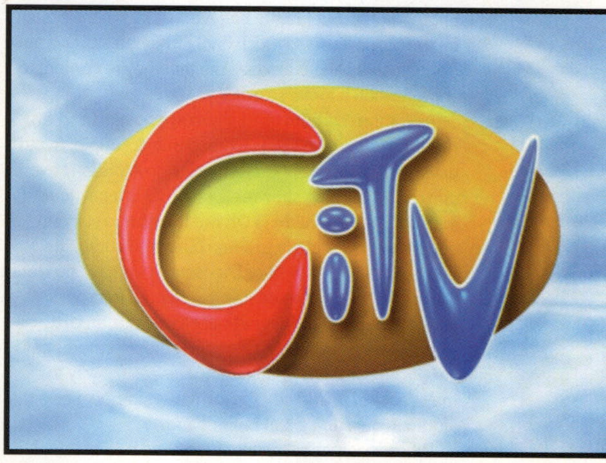
> ***"Keep it short – I've got the attention span of celery and the bin's right under the desk"***

Content over style

Kim Aldis at Aldis Animation explains what it takes to make an impression: "I'm less concerned with style, more interested in content. Anyone who can show proven animation skills will grab my attention because if you can coerce a computer into chucking out top-notch movement then you can probably do anything, although I'd emphasise that in a company like ours it's unlikely that anyone will be doing just animation – we chuck pretty much anything at our chaps."

Quality, not quantity, is the key. Showing prospective employees an entire portfolio of full-length animations is not a good way to impress somebody who probably has to wade through job applications and accompanying materials every day. "Keep it short and only put in the very best of what you've done," agrees Kim. "I'm sick of looking at ten-minute animations of 30-second stories from students. I've got the attention span of celery – I get bored real quick and the bin's right under the desk.

"I'm also pretty hot on lighting and colouring. It's probably because I'm an ex-lighting cameraman and



(top) The Children's ITV logo as created by Aldis Animation. Contrast its friendly colours and roundness with...

(above) ...the firey simplicity of the Sci-Fi Channel's logo.

(left) Much film and TV 3D effects are designed for compositing rather than being stand-alone.

(right) Designing for kid's TV might seem simple, but it takes an eye for detail.

photographer, but I really believe that this is the polish on the scene. I see so much badly finished stuff coming from students and it amazes me that they're content to show it when it looks so drudgy."

As for the medium used, there are no hard and fast rules, but again the key is to keep things simple. Avoid unwieldy, or less popular formats. Kim Aldis isn't even convinced burning showreels onto CD is a particularly sound idea. "CD-ROM is OK but it's slow to start up and I may not be close to a machine with audio," he point out. "I prefer VHS or DigiBeta – we have no Beta SP or DVD, though when high bandwidth Internet access becomes more generally available, an URL wouldn't be a bad idea." Of course, these preferences vary from company to company. The easiest way to make sure of using the right format is simply to give the studio in question a call beforehand.

When it comes to qualifications, the rule of thumb is you won't get far without them. There are exceptions. Very small companies have less pulling power and so are likely to be willing to give less academic artists a shot if their work is up to scratch, while one or two larger operations may well have the patience and resources to train new recruits up. But it's always easier to get noticed if you've got the written credentials to back up that talent.

Degree of chance

You should even be aware that many prospective employers also take into account where a qualification has been obtained. "The college is often more telling than the qualification per se," reveals Kim Aldis. "I'll always look at anything from the London Animation School because I know the way the course works and they churn out people with a practical understanding of what we do here."

This approach reflects a growing tendency for effects companies to select candidates who have studied in the appropriate fields (if not necessarily the same 3D packages), rather than gaining competence in the full complement of artistic styles and consequently fully mastering none. Some might even question whether pen and paper skills are even necessary in an industry focused on 3D packages and animation techniques.

"Well, I can't draw so I guess not," says Kim Aldis. "But it's good to have at least one or two guys around here who can. The more feathers in your bow, I guess. It's only fair to point out that there are people out there who won't even look at you if you can't draw but I'm easier. I really like to see animation and lighting skills."

Finally, it's worth noting that, while an understanding of film and TV is useful, studios like Aldis are flexible with graduates armed with more general 3D design skills. "We can cover to a certain extent using the experience of the older guys but you'll need to build on it," explains Kim. This means newcomers can learn by experience. "We try and make our guys follow through from shoot to post, to get a feel for the difficulties and needs of other people in the process," he concludes.

Visit Aldis Animation's Website
at [w] www.aldis.co.uk

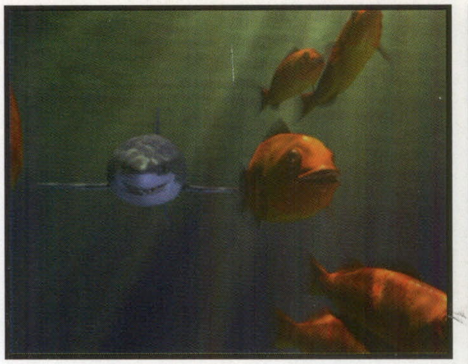
When it comes to qualifications, the rule is, you won't get far without them

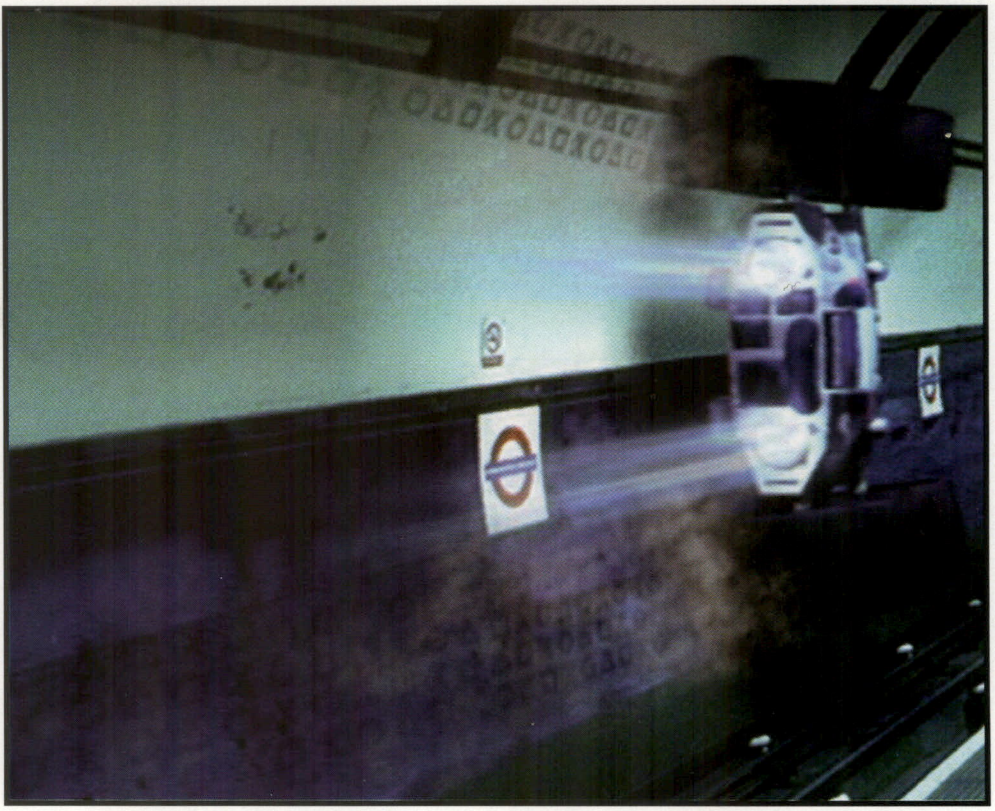
Fast times

Teamwork is essential in creating 3D for the big screen

In reality the TV and film connection may not make working in this area particularly glamorous, but it does result in a gloriously unpredictable and fast-moving profession. "No job is the same. I've never been bored in 20 years of TV work and I don't look likely to be in the near future," says Kim Aldis. "These are exiting times for 3D, 2D, TV and film. I've seen, in 15 years or so, people struggling for a year to make a 20 second short, to a team churning out a feature film in three years. It just gets better and better."

It's also worth noting that, because of the size and urgency of projects, artists rarely work in isolation. Teams can be together for hours, days or months, and can vary in size from pairs to every available employee. Needless to say, when the pressure is on, good teamwork is utterly essential. "They have to be team players," says Kim. "If they're not, or if they rub people up the wrong way, they'll get their tea pissed in."

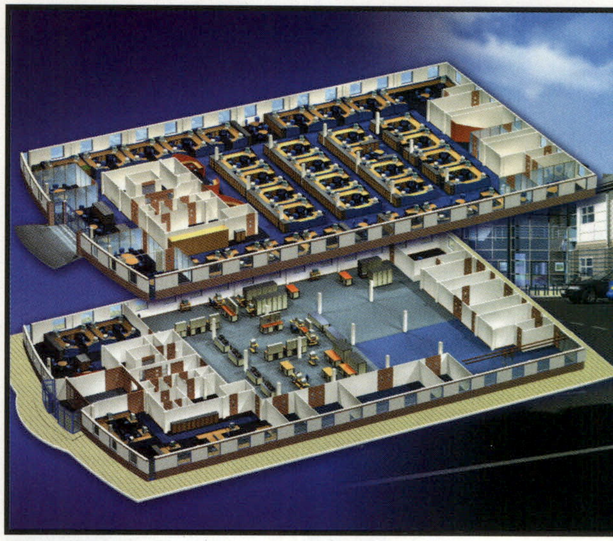




(top and right) Aldis Animation doesn't just create imaginary scenes – it's sometimes also called upon to produce more realistic imagery.

CAD & architecture

Creative flair and an eye for detail are what's required if you want a career designing cars for Audi or mobile phones for Nokia



CAD studios tend to work with a wide range of clients, which in turn means dealing with a vast array of modelling assignments. As a result, this is one area of 3D design where accuracy and raw artistic skills are absolutely essential. *Computer Arts Special* spoke to Real-Time Visualisation, for example, a company with a list of projects covering everything from Nokia phones and building visualisations to technically exacting cross-sections of Audi motor cars.

"A high level of illustrative ability, an eye for unimaginable levels of detail, technical accuracy, self discipline and creative flair," are what Real-Time Visualisation's Tony Prosser lists as the necessary skills for this profession.

> *"3D is very good at hiding people's weaknesses, images look fine until you dig deeper"*

Attention seekers

He suggests that the most 'attention grabbing' portfolio would use both printed material and a CD for still images, with a VHS for animation, and include either conventional drawing and paint-based work along with a recent translation of this skill using 3D software. Alternatively, he suggests putting together a presentation showing "extensive evidence of high-quality, complex 3D imagery and animation including lifelike human characters and some photo-realistic tangible subject matter".

There have been exceptions to the rule at Real-Time Visualisation, though, with the company training up recruits employed on the basis of exceptional traditional art skills. "Some of Real-Time's finest digital artists have been trained through this route", reveals Tony.

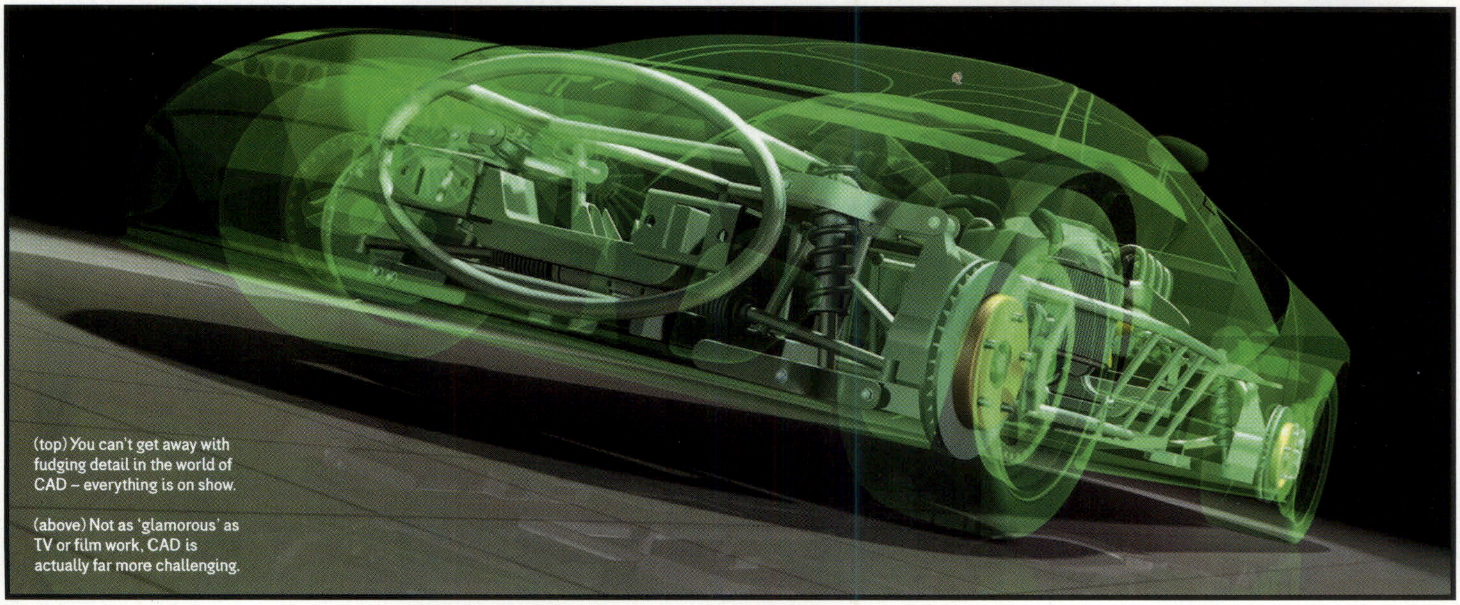
While degrees are good, they're by no means essential. But one thing applicants are unlikely to manage without is basic drawing skills. "We produce traditional hand-drawn storyboards for almost every animation project," says Tony. "This comprehensive planning stage enables the client to clearly understand how the sequence will work, and if necessary make changes before the more costly animation production begins. It is very important for these traditional storyboards to be of high quality and very detailed to clearly explain the concept to the client."

In terms of putting together a showreel, the nature of CAD work means applicants have remarkably free reign in terms of subject matter, but little room for slack in terms of accuracy. Tony suggests using "any form of visual material that demonstrates a high level of skill, detail and 'visual excellence' – this could be illustrative use of paint, airbrush, 3D renders, 2D *Photoshop* or vector illustration, including any form of animated material." The usefulness of 2D work may surprise, but the reasons for it are sound.

Hidden dangers

"3D is very good at hiding people's weaknesses; we get sent hundreds of 3D images and animation sequences that 'superficially' look fine – until you dig deeper!" adds Tony. "If you take on an artist based on a portfolio of colourful, exciting and 'superficially' good looking work, this by no means demonstrates that they can produce highly complex imagery from orthographic drawings in a sensible time frame."

Visit Real-Time Visualisation's Website at [w] www.realtimeuk.com



(top) You can't get away with fudging detail in the world of CAD – everything is on show.

(above) Not as 'glamorous' as TV or film work, CAD is actually far more challenging.

Product design

Technical wizardry counts for nothing if you lack the imagination to create eye-catching designs and forge your own individual style

The role of product designer is arguably what the truly creative 3D artist is best suited to. This is an area in which flair and inspiration are fundamental requirements, where all the accuracy and technical proficiency in the world counts for naught without imagination. For those seeking employment, the key is clearly to demonstrate an affinity for these requirements as soon as possible.

Design for life

"In our line of work we have to look for eye-catching designs that will grab our attention from the off," explains Neil Roddis. Neil is technical director at Fluid, a design team whose most recent achievement was a top five placing in the Best Originality Category at the Flash Film Festival.

> *"The prospective employee must be able to sell themselves, as they will be asked to sell a brand"*

In other words, consider the presentation of the portfolio itself as an opportunity to demonstrate a talent for 3D product design. As Neil says, "As we are working at the forefront of design, the prospective employee must be able to sell themselves, as they will be asked to sell the item or brand of our clients. The package or whatever they send should have something individual to say about them, rather than the boring usual CV that we see so often."

Ideally, the portfolio and its contents should be as much about displaying a unique approach as demonstrating artistic competence, though Neil does concede this isn't always easy. "In today's market it is always good to have a different style, but it is always very hard to find something new that hasn't already been done before."

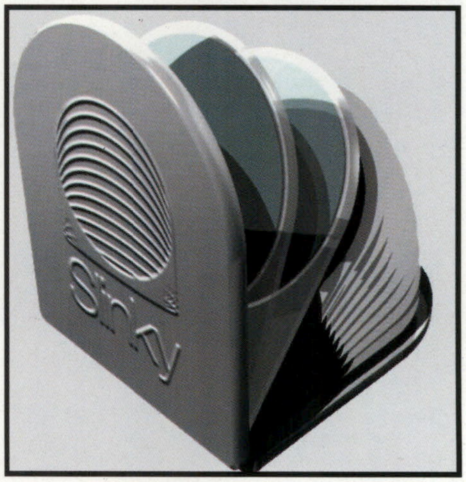
With originality of presentation arguably as important as the content itself, it's not surprising that there are no firm rules about their nature or the medium used. "We have lots of different types sent to us, from nicely designed packages to CD-ROMs and even Websites," says Neil. "Each can be just as effective, so long as some thought has gone in to it."

Natural talent

There's also a degree of flexibility when it comes to the artistic skills a prospective employee can offer. Although product design demands strong 3D abilities as well as a talent for inventive design work, it's the latter that's clearly the most important. "The employee must have a natural talent for design, as it is very hard to teach these skills to someone who doesn't possess them," confirms Neil. "The same could be said for 3D skills, but we find that with the new talent coming from the universities, they're virtually brought up with Macs or PCs and so it's easier to teach these skills."

Even so, Neil does agree that some core 3D skills, and experience with the leading software packages is preferred. "As so many of today's design skills are becoming more and more closely related, I think employers expect much more from their workforce, and consequently they're required to arrive with considerably greater knowledge than ever before.

"Obviously it depends on the given role the employee has to take. If the role is, say, an art director they will have to be very much aware of modern packages and techniques and so on, and similarly the



(left) Even if the item never makes it to manufacturing, you can learn a lot about 3D from product design.

(right) Producing functional yet stylish items like this CD holder is perhaps the ultimate test of a 3D artist.

(far right) As Fluid points out, products need to be envisioned from all angles – there's no 'faking' here.

operators must also have a greater awareness of these various factors."

Not surprisingly, *3D Studio Max* is the 3D package most commonly used by product designers, though as with any area of 3D design, a working knowledge of any of the popular packages, such as *Infini-D*, *LightWave*, and *Strata Studio Pro*, is just as valid.

One other thing to consider is that, while demonstrating originality and an individual style is a great way of grabbing attention, product designers must also be able to tailor their own vision to meet the needs of the client. Neil believes that one of the reasons for Fluid's success is the way a knack for approaching projects in a unique way is tempered with artistic flexibility. "We can give something different to the client but at the same time don't force a set style upon any given situation."

Job satisfaction

In fact, learning to deal with the needs and whims of clients can be half the battle in product design. "Some are very easy to work with and realise that they have hired you to do a job that you are good at and leave you to it. This is when we find our best work is completed. There's real satisfaction in seeing a project go from original conception on the computer through to the final product without too many changes."

However, some clients have very firm ideas about what they want, and for better or worse a product designer must abide by that. "All you can do is to try and advise them and steer them in the direction you feel is right," says Neil. "A compromise is usually the situation." Learning to deal with such compromises professionally is unfortunately one skill that can only be learned out in the field.

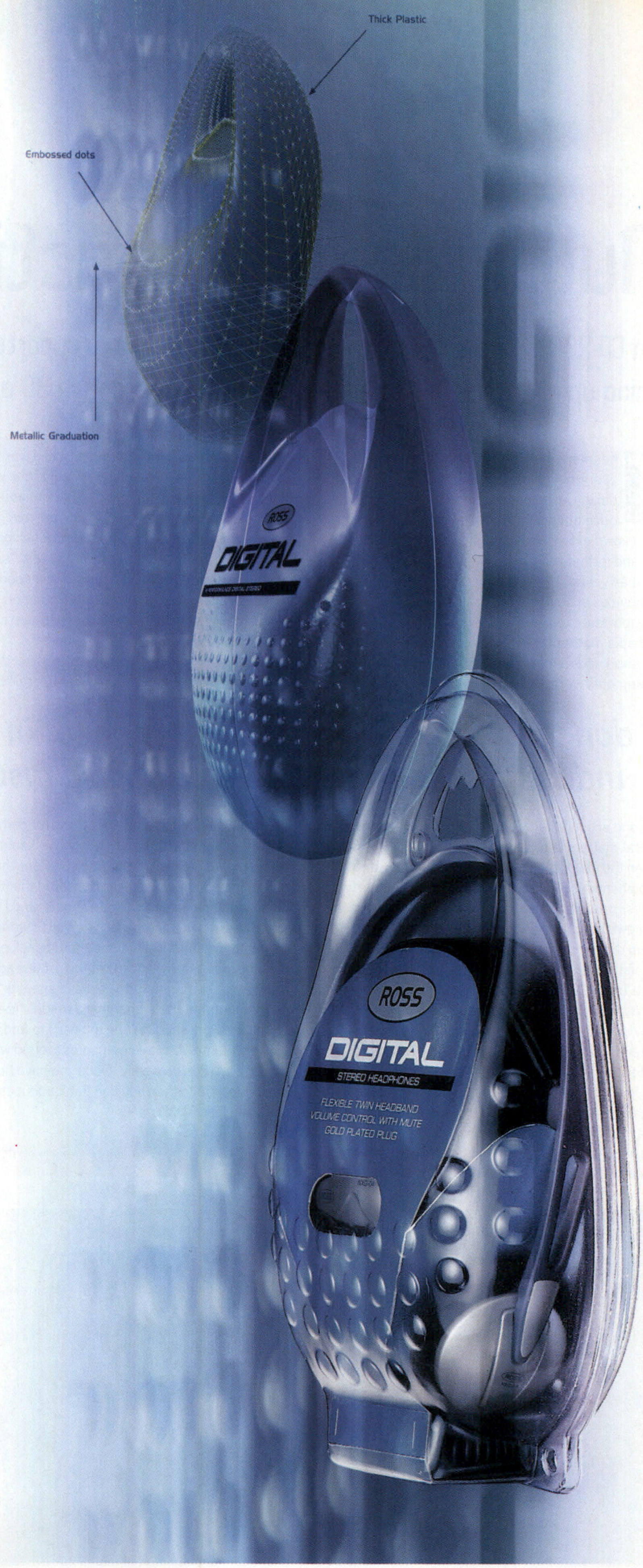
Visit Fluid's Website at [w] www.fluidesign.co.uk

Fluid Design

The skills you need to design innovative products

Fluid actually works for clients on several kinds of 3D design projects. Given this wide range of expertise, Neil is acutely aware of the necessary skills that are unique to product design. "I would say that the ability to think in a three-dimensional environment is the most obvious," he says. "Items must look good from all angles, yet achieving this can sometimes introduce many problems and hurdles to overcome."

Efficiency is also highly desirable in an industry driven by the need to satisfy a client's needs as fully and speedily as possible. "A modeller must sometimes think way ahead of themselves to create the desired effect and obviously to save time. As most 3D modellers will tell you, there are many ways to create the same object, some a great deal faster than others. Again it's about getting to know the software you are using and learning to use it well!"



Multimedia, interactive & the Web

From CD-ROMs to the World Wide Web, there are new opportunities opening up every day for designers to create interactive 3D art

The interactive 3D umbrella covers everything from multimedia CD art to Web design, each particular niche placing different demands on the artists, and making use of its own extensive range of packages, often with trends and formats changing over the space of months rather than years.

An obvious example is the rise of *Flash 4* as the most important tool for Website design. The CD-based multimedia market is perhaps less volatile, but even here a good understanding of how and why interactive page elements work alongside each other is a must. This is one artistic field where a strong knowledge of technical matters is essential.

> **"I don't think experience counts for a lot in this industry, as technology is moving so fast"**

Given the ubiquitous nature of the World Wide Web and its phenomenal rate of growth, there are clearly countless opportunities. The low overheads also mean many newcomers are choosing to create their own start-up design companies rather than seek more traditional employment.

Luke Turner at The Void is one such designer. "The Void was really a complete accident," he reveals. "I had no previous animation or computer related design experience, although I was training to be a graphic designer/commercial artist. After fooling around with *Flash 3* for a few months, I realized that I might be on to something good. I built and launched my own site and almost immediately it attracted some attention."

The site won the Macromedia Shocked Site of the Day award. This started a domino effect, leading to hundreds of thousands of site 'hits' and work using a pioneering 3D texture-mapping technique within *Flash* for brands such as MTV, Excite, Macromedia and UPS. Some of this work can be seen at The Void gallery.

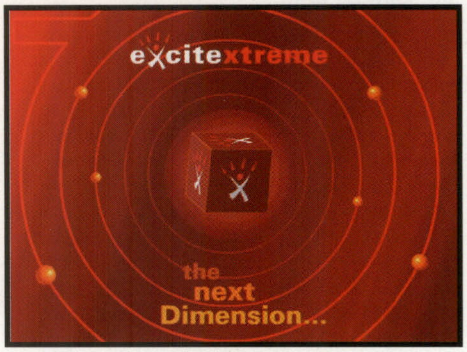
"I don't really think experience counts for a lot in this industry, as technology is moving so fast," says Luke. "I would say that the main attributes you need to be successful are initiative and determination. These things are vital if you want to stay one step ahead of your competition."

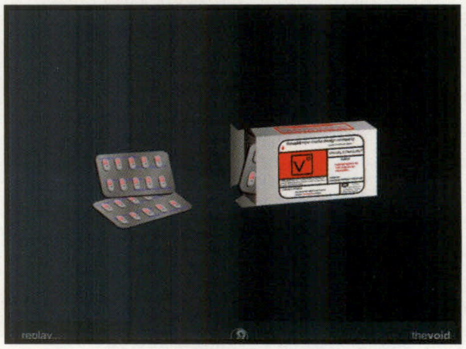
Although The Void specialises in *Flash* design and animation, more conventional HTML projects are also taken on, indicating a general trend for companies to provide clients with an all-in-one Web solution. "We don't provide any e-commerce solutions though," says Luke, "mainly because I just don't find that type of work exciting. I love to design and animate, and I think that such passion is what makes The Void's work special."

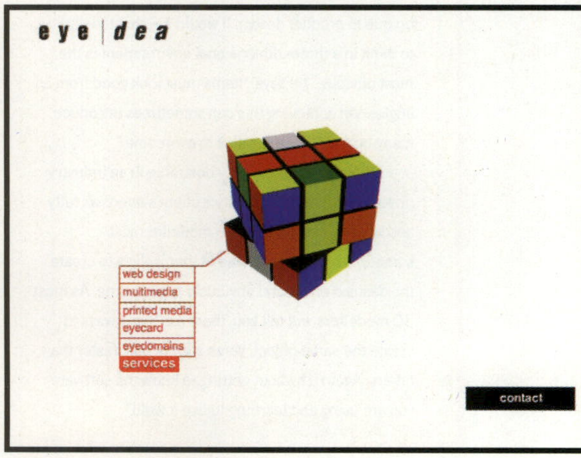
As for whether individuals should seek employment or consider setting up on their own, Luke advises, "My advice to aspiring multimedia designers is to get a few jobs under their belt, charging a modest fee to start with. The work shouldn't be too hard to find, as there will be plenty of small companies around who require a small on-line presence. Once you have built up some sort of portfolio then you can think about applying for suitable jobs." ca▸s

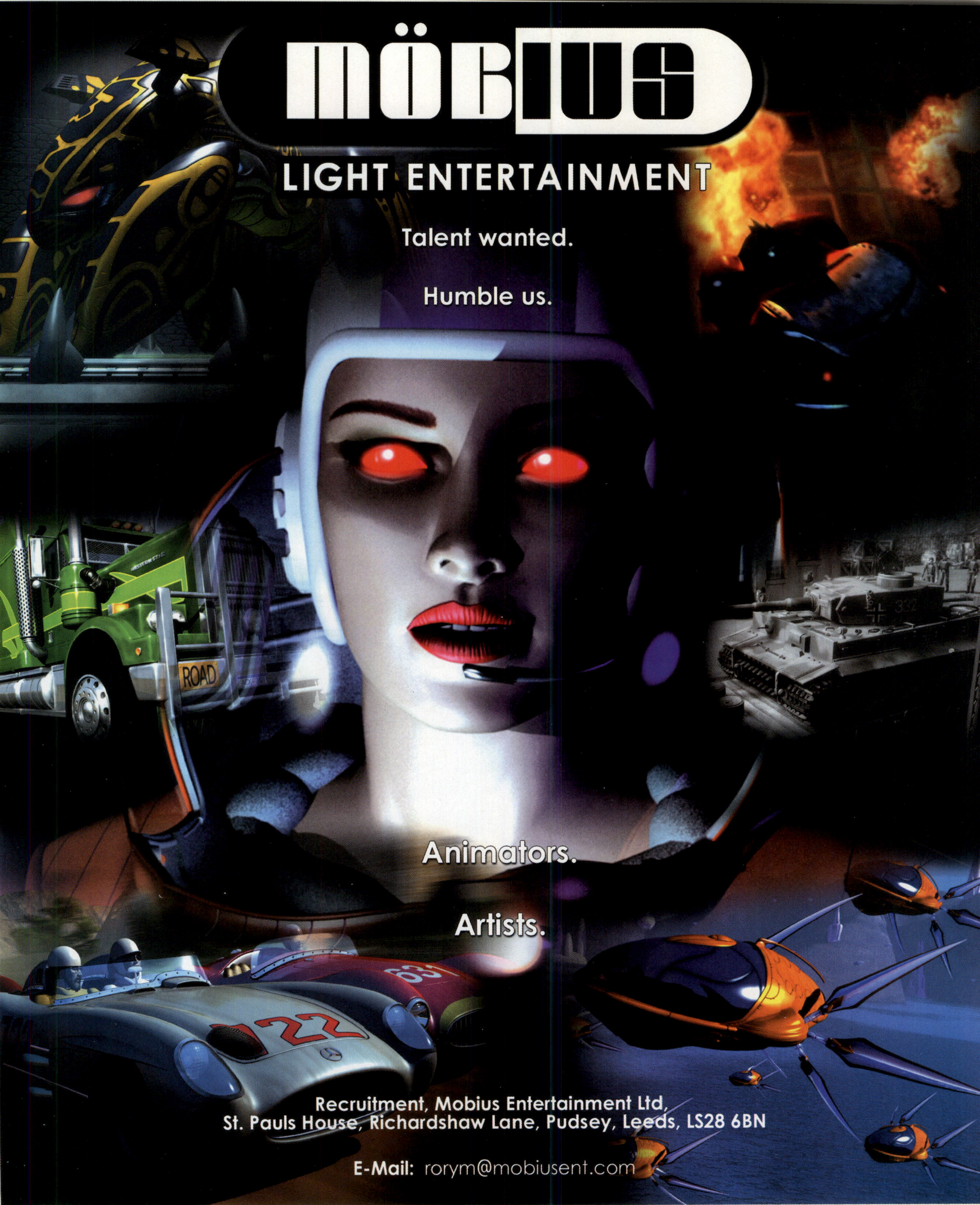
Visit The Void Website at **[w]** www.thevoid.co.uk/high.html and **[w]** www.thevoid.co.uk/V3d

(this page) 3D Website design by necessity has to be streamlined and simple, but there are also ways around the bandwidth problems.









Recruitment, Mobius Entertainment Ltd,
St. Pauls House, Richardshaw Lane, Pudsey, Leeds, LS28 6BN

E-Mail: rorym@mobiusent.com

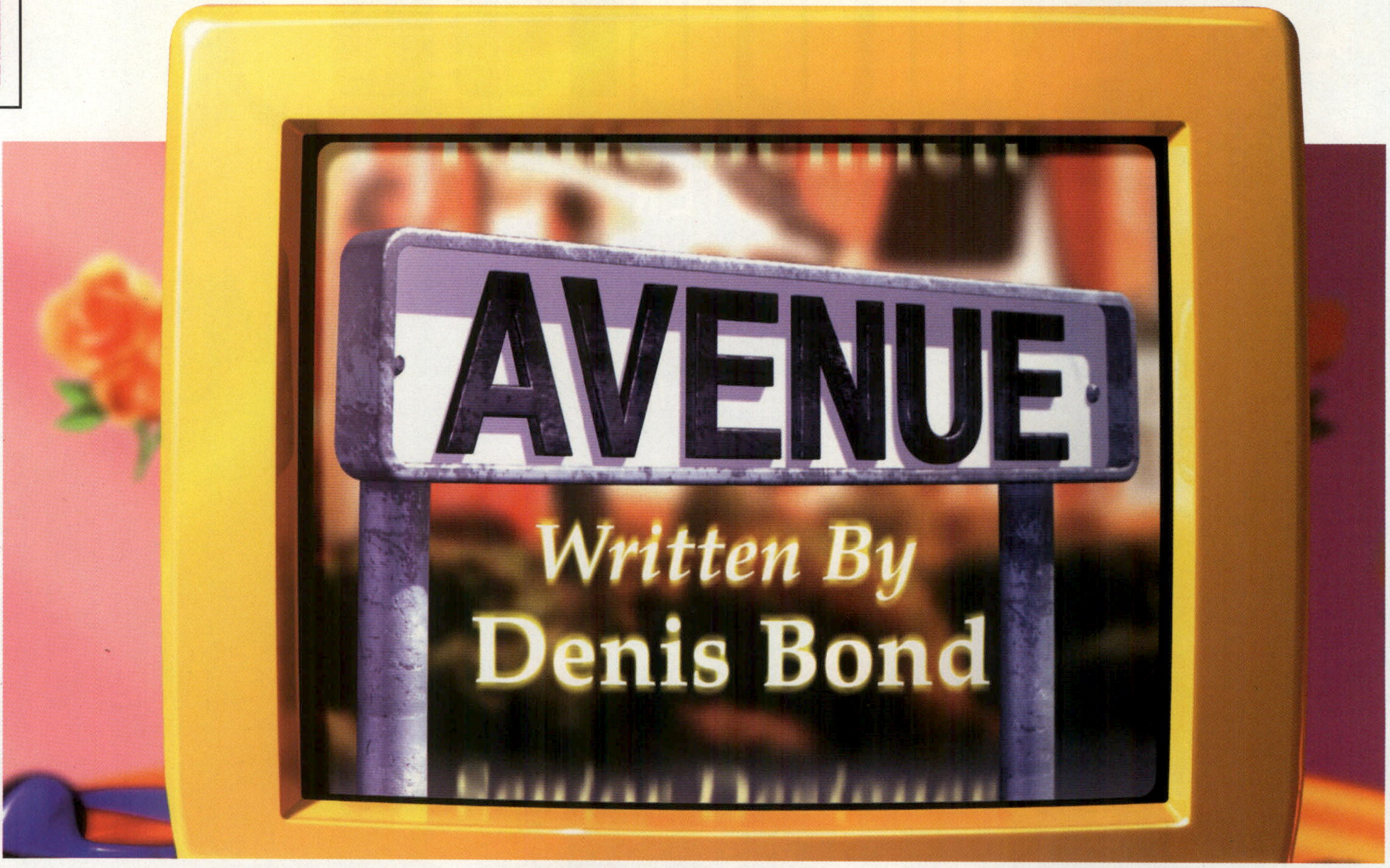
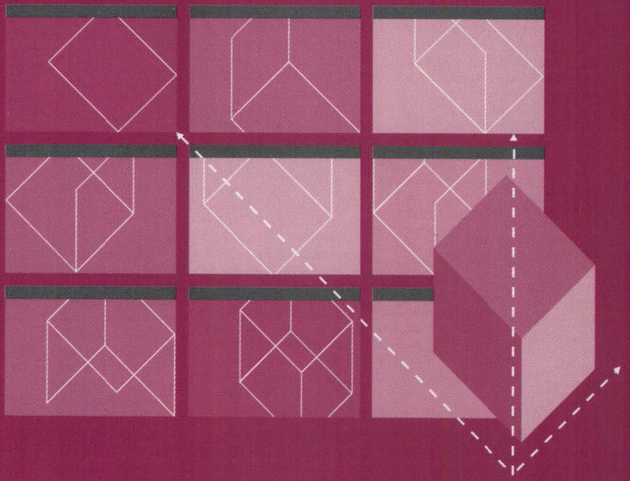


Illustration: Studio Liddell. **Telephone:** 0161 272 8473

Realistic modelling

Take one commission for a book cover, stir in some highly talented illustrators, and what do you get? Go behind the scenes of an actual job with Studio Liddell and see how the pros do it…



Sometimes 3D isn't all about spaceships, fantasy worlds or the like. This project to create a realistic, but stylistic, TV comes from an actual brief given to Studio Liddell, the company behind the image, which its design team recreates here.

The brief was to produce a cover for a teenage girls' book, immediately conveying the central character's obsession both with a fictional soap – *Avenue* – and with the main heartthrob. Studio Liddell was supplied with a loose visual stipulating that the central elements had to be a portable TV and a heart-shaped picture frame. These were to go alongside other items, to add a sense of realism.

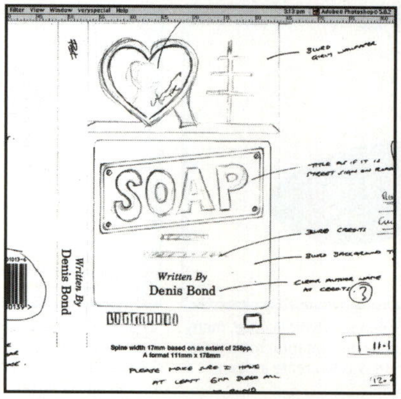
To recreate this image, first concentrate on the techniques used for the TV – then you can use combinations of these techniques to create all the supporting items. Studio Liddell used *form·Z* for the modelling for its robust tools, and *Electric Image* for the final render.

Try it out

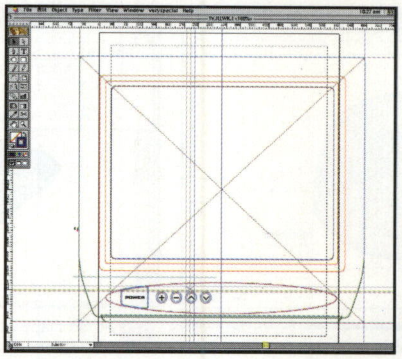
You can find a demo of the superb *form·Z 3.5* on the CD, although most 3D packages should include the toolset you need to create this image.

Part 1: Reference material and groundwork

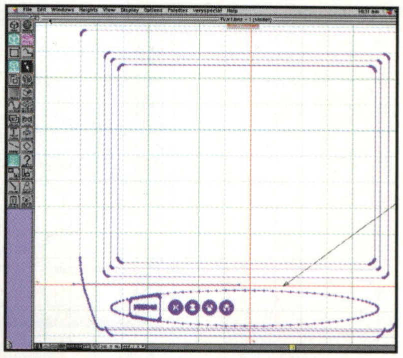
To get started on the project, you first need some basics to work with. Most artists begin by sketching the final scene and elements of it before even touching the computer.



1 Here's the visual supplied by Scholastic books, detailing the size, positions and content required.



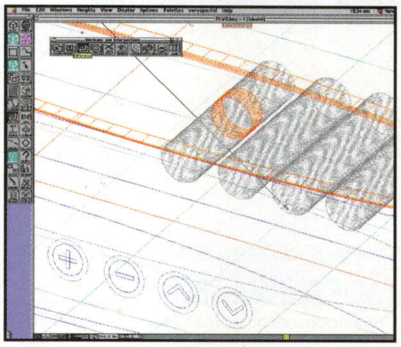
2 Based on the general proportions of existing portable televisions, a nondescript front view was created in Illustrator, each element being a closed path ready for export into *form•Z*.



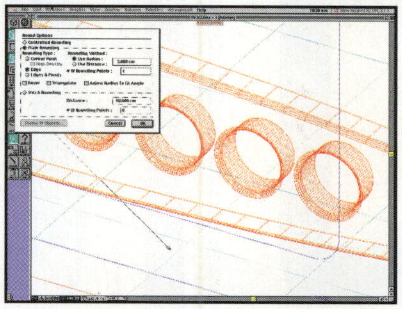
3 The *Illustrator* profiles are then imported into *form•Z* with 24 points per Bézier curve, rather than the default 12 points. This gives the model far smoother curved elements.

Part 2: Modelling

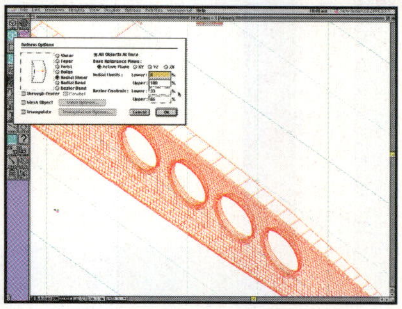
Once you've got the initial basics for your image, you then need to begin the modelling. Concentrate on the main areas first and worry about detail later – you'll save worry.



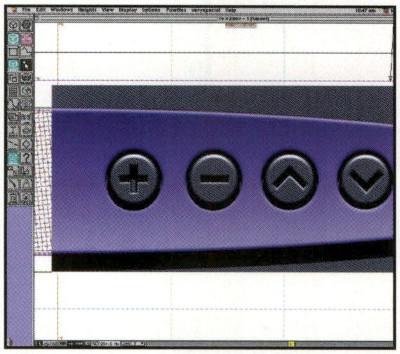
1 Starting with the extruded button panel, Boolean the holes from the main panel – these will eventually contain the buttons.



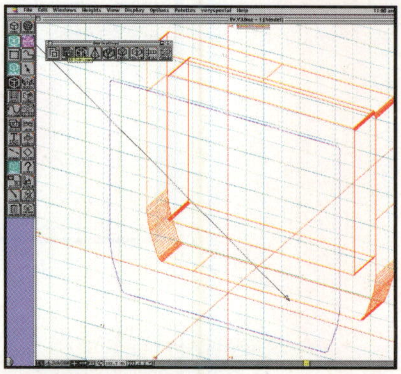
2 As all the surfaces on this model have smooth edges, each Booleaned edge has to be rounded. It may add significantly to the polygon count, but it'll produce a far more realistic final render, particularly at a high print res.



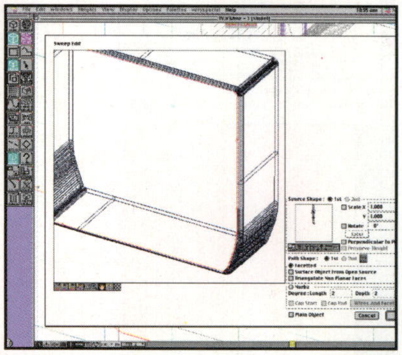
3 To create the bowed appearance for the button panel, you first need to tightly mesh the object – without this, the Shear Deformation tool doesn't have enough polygon information to create a smoothly deformed surface.



4 Once all the button panel elements have been created using combinations of the Extrude, Boolean and Round techniques, it's a good time to check for any irregularities.



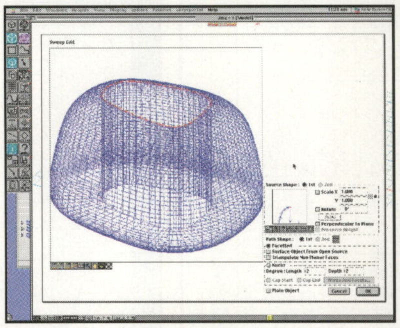
5 The television body profile is first extruded, and then the internal hole which will house the TV screen is Booleaned from it.



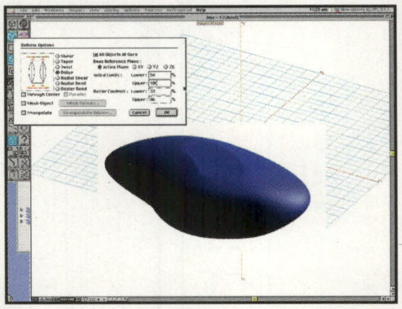
6 The curved edge elements to the TV body are created by 'sweeping' the edges along the same profile that was used for the initial TV body extrusion. This produces no noticeable joins.

Part 3: Additional elements

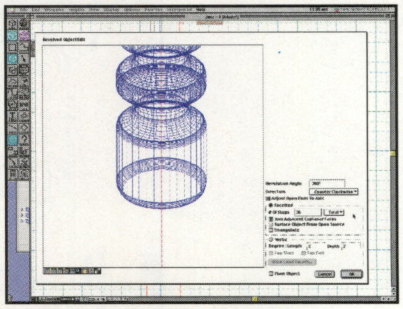
Now you have the focal point, it's time to get to work on the fiddly bits. Although detail is important, always bear in mind what is and isn't going to be seen in the final image.



1 The aerial unit had to be a modern 'jelly' style product. To achieve this effect, first sweep a source shape around the imported base unit profile.

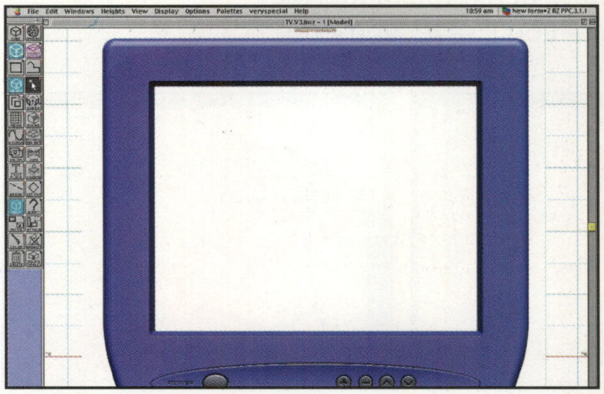


2 As the shape was open to artistic licence, many applications of various deformation tools were applied. The only criterion was to create a clean, smooth jelly mould shape.

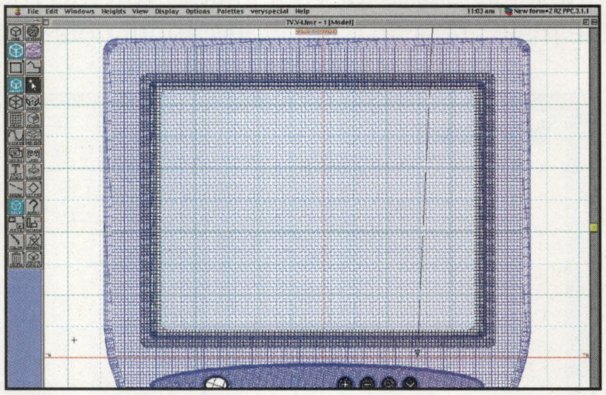


3 Next, model the aerials using the Revolve/Lathe tool. It should only take 36 steps to create, since the aerials were quite small on the final artwork for the book cover.

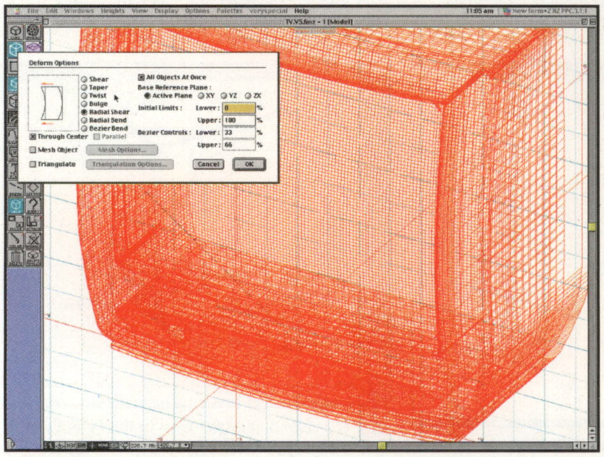
Part 2: continued...



7 Once all the elements are in place, you need to perform a quick test to check for bad surfaces.



8 Then, to prepare the TV for deformation, apply a tight mesh onto all the surfaces to be deformed.



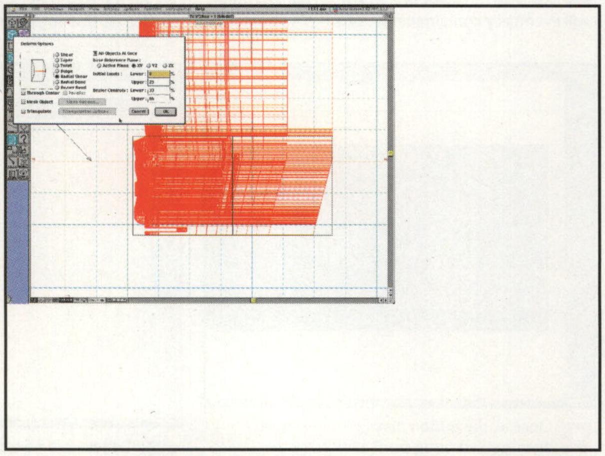
Deform Options

○ Shear
○ Taper
○ Twist
○ Bulge
● Radial Shear
○ Radial Bend
○ Bezier Bend

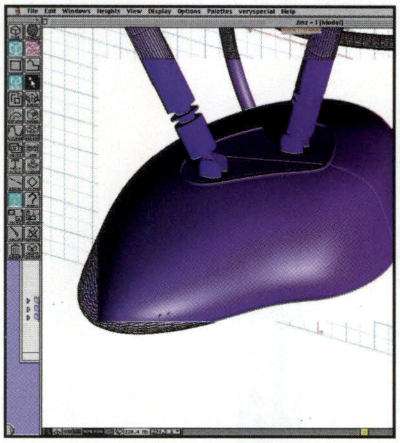
☒ Through Center ☐ Parallel
☐ Mesh Object
☐ Triangulate

☒ All Objects At Once
Base Reference Plane : ● Active Plane ○ XY ○ YZ ○ ZX
Initial Limits : Lower : 0 % Upper : 100 %
Bezier Controls : Lower : 33 % Upper : 66 %

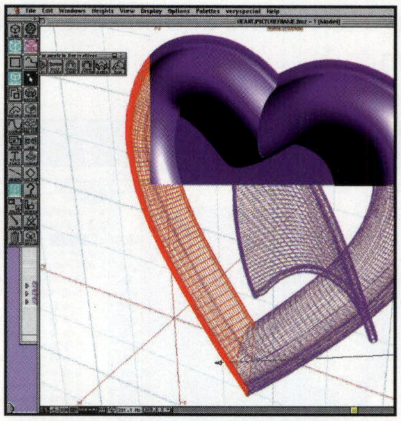
9 Next, select all the objects and apply a single Shear deformation in both X and Z directions.



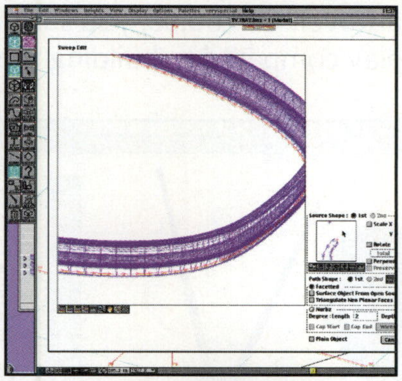
10 The base section needs further deformations to make the TV convincing. Do this by limiting the deformation region to 25 per cent of its height.



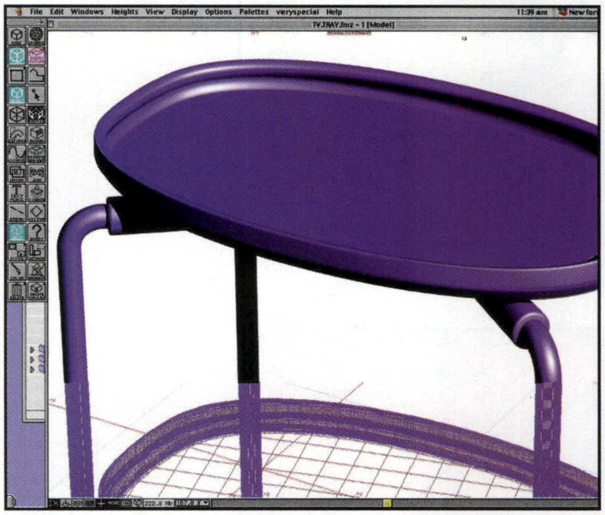
4 Once all the elements are in their respective positions, you can try a simple test render to check the model's integrity.



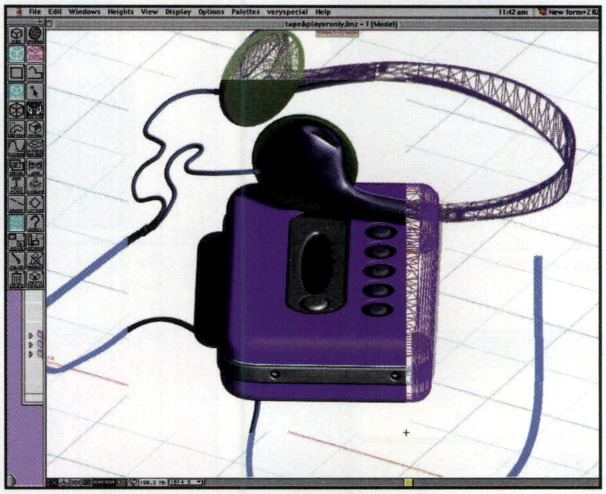
5 The Axial sweep tool is used again, the source shape being swept around the heart outline. Then create the stand using the same Extrude, Round and Deform tools as before.



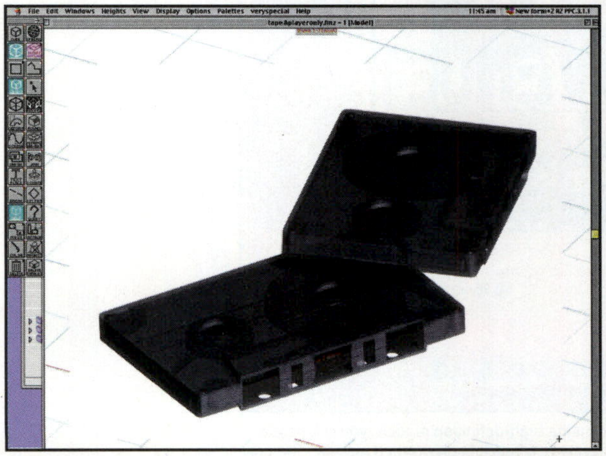
6 The tray the TV is sitting on appears close to the viewer, so it needs to look clean and have no imperfections, as we then want to apply a reflection map to it in *Electric Image*. You do this using the Sweep function together with high-definition source shapes.



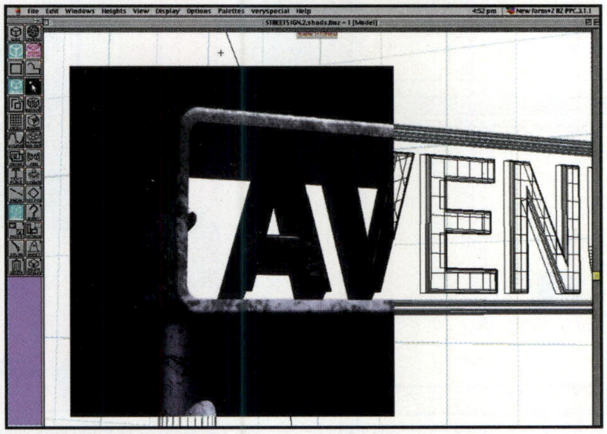
7 Once the legs and holders are in position, you need to check it for integrity. Make sure you check the objects from all positions.



8 The nondescript tape player and headphones are next, and these sit to the left of the TV. This model was created completely using the same Extrude, Boolean, Round and Deform tools as for the TV button panel.



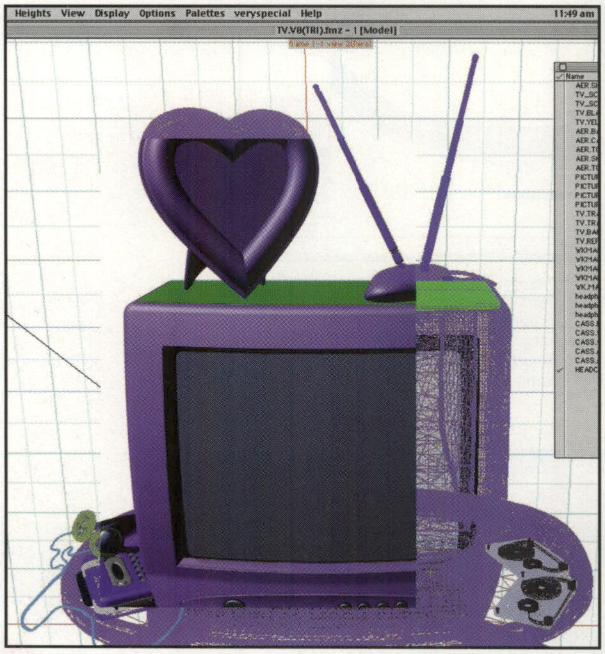
9 Next was the audio cassette, which sits to the right of the television. This only had to be medium resolution – so no rounding to the surface edges.



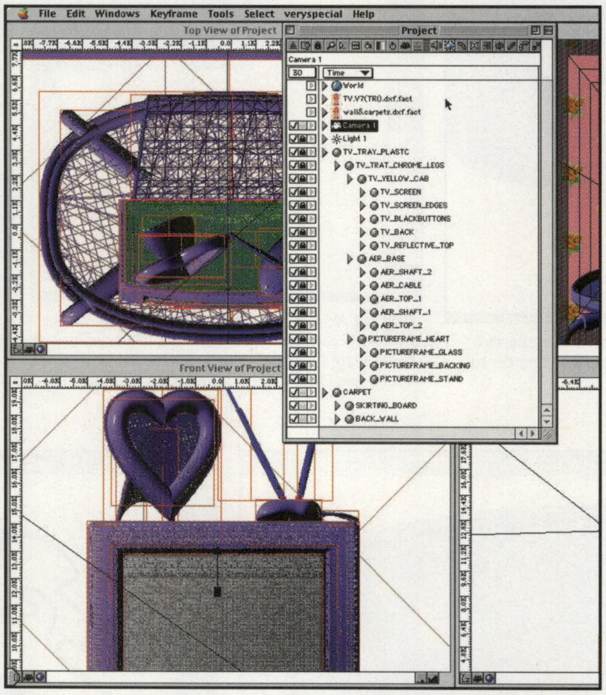
10 For a final touch, the television screen image was to be the closing credits to the fictional soap. The street sign was modelled and rendered with alpha channel, so the background image could easily be dropped in with *Photoshop*.

Part 4: Export and render

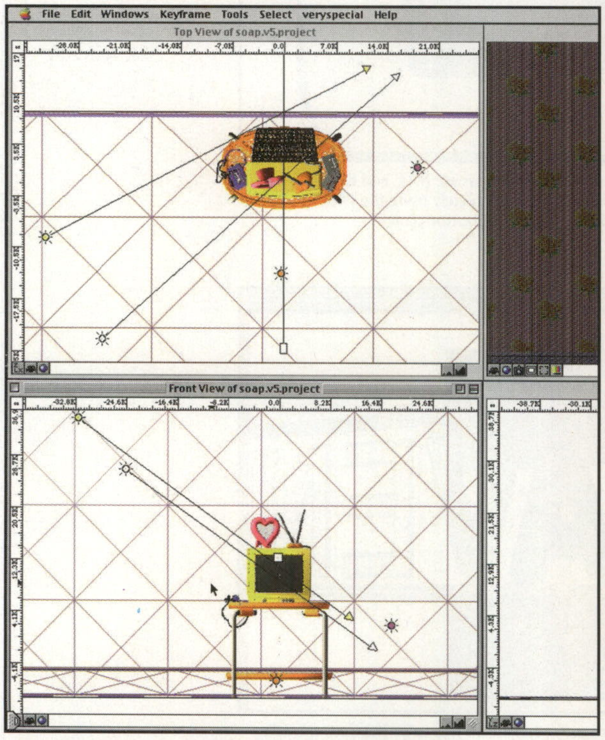
That's the hard part over. Of course, you still have to texture and surface all the objects, but that's child's play compared to building them…


Heights View Display Options Palettes veryspecial Help 11:49 am
TV.V8(TRI).fmz - 1 [Model]
Name

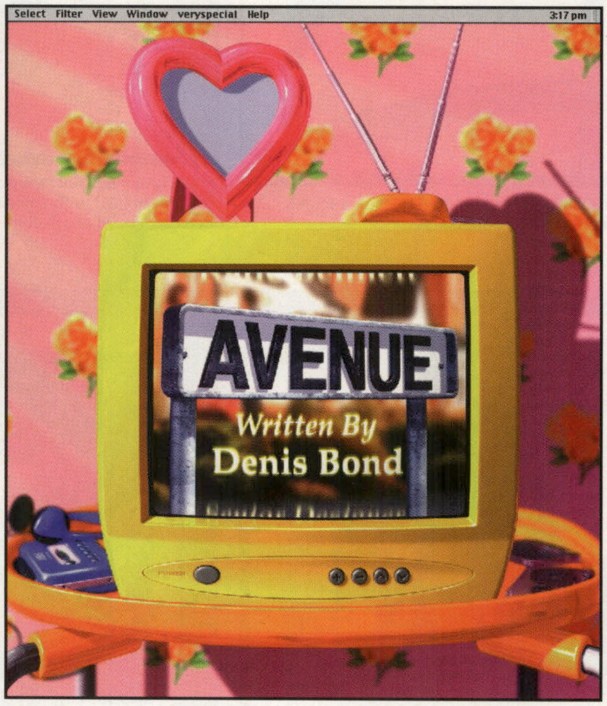
7 All the various models are placed into one master scene, and it's now ready for export. Export it in the Fact format as layers, and make sure you optimise the scene into as few layers as possible. The colouring process can be greatly speeded up in *Electric Image.*



8 Once imported into *Electric Image*, the relevant objects are linked together for easy manipulation. Now the required view can be achieved.


File Edit Windows Keyframe Tools Select veryspecial Help
Top View of soap.v5.project
Front View of soap.v5.project

7 The appropriate surface styles and textures are applied, and the lights put into position. Several hours later, and it's ready for the final render.



8 As more effort was spent creating high-definition models, you can save a great deal of time by not having to retouch badly-formed meshes. The only retouching you should require is adding the character into the photo frame and subtle highlighting through the use of fill lights.

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Software [Buyer's Guide]

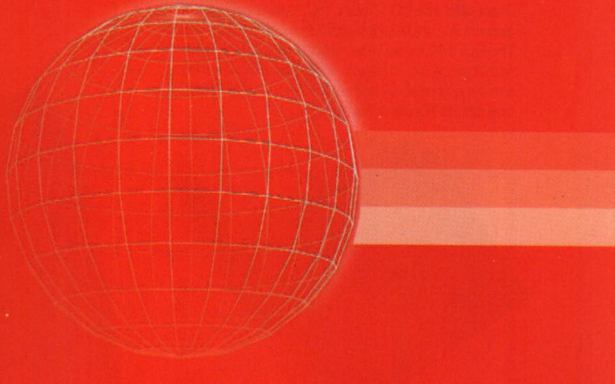
Thanks to the diligence of our sister magazine, *Computer Arts*, we can draw on a huge archive of software reviews for all aspects of 3D modelling. Here's your guide to the best packages around...

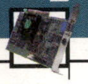
3D software reviewed in Computer Arts

Name	Platform	Price	Company	Tel/Web	Stars	Iss
Under £300						
Shaderman	PC/Mac	£106	PAR Services	020 7437 1486	4.5	32
Another LightWave plug-in essential for producing dry-looking matter surfaces. There's metal, plastic, plank, marble, rubber, clouds and more to choose from. You can even animate the shaders.						
Amorphium	PC/Mac	$150	Play Inc	www.play.com	4	33
This program's simple interface makes 3D shape sculpting a dream. Work from primitives, to quickly and experimentally achieve the shape you want. And it doesn't require expensive hardware to run.						
Tree Druid	PC/Mac	£135	PAR Services	020 7437 1486	4	32
Botanical plug-in for LightWave. You can have complete control over the way a tree looks from the trunk, up to the branches and out to the leaves. You'll quickly find the urge to have forests in every scene.						
Vue d'Esprit 3	PC	£149	HiSOFT	01525 718 181	5	40
Specialised landscape renderer that turns greyscales into relief terrains. It uses procedural materials and textures and also boasts fog, haze, cloud and sunlight features. This is one to watch.						
Illusion	PC	$250	Impulse	www.coolfun.com	4.5	42
This particle generator features an excellent real-time preview facility and handy deflectors to stand in for final 3D renders. Superbly quick, as all calculations are done in 2D, this is real value for money.						
Animation Master 2000	PC/Mac	$299	Hash Inc	www.hash.com	5	42
Easily competes with all top-of-the-range character animation tools, but at an incredibly low price. Animation Master has full skeletal and muscle control, lip-synching, motion blur, plus fur and cloth simulation.						
DarkTree Textures	PC	£282	Digimotion	020 7287 3510	4	32
Texture creation proving too time consuming? One answer is procedural texture generation – the mathematical creation of textures. It's a bit like making fractals, but far more controlled and useful.						
PiXELS:3D 3.2 Studio	Mac	$299	Pixels	www.pixels3D.com	4	37
Strange package with a spline-based surface modeller. It supports NURBS, B-splines, Catmull-Rom and Tau. It tesselates all surfaces before shading for resolution independent models. Good shading too.						
Merlin VR	PC	$129	Digital Immersion	Digital Immersion	3.5	43
Decent 3D application with attractive, tidy interface, real-time rendering and good deform tools. There's no undo, no key shortcuts and you can't create 3D text directly, but it's an affordable option.						
Under £700						
Ray Dream Studio 5.5	PC/Mac	£340	Computers Unlimited	020 8358 5857	3.5	37
A new interface and a new bubble modeller make this useful for creating organic, fluid forms. Four Elements expansion pack adds a terrain and landscape modeller. Good tutorial CD with 200 models.						
Canoma	PC/Mac	£399	Computers Unlimited	020 8358 5857	4	34
Rocket science in a box. Create 3D scenes from photographs, then save them and manipulate them. Real world sampling for 3D has never been this easy. No curves – the only letdown.						
RayMax 2.5	PC	£470	Digimotion	020 7287 3510	4	32
A raytracing plug-in for 3D Studio MAX offering great levels of realism. You can specify reflectivity and specularity, and even calculate internal reflections and caustics. Soft shadows and depth of field also feature.						
ProOpticSuite	PC	£470	Digimotion	020 7287 3510	4	32
Three MAX plug-ins in one box. PyroCluster 1.6 sorts your smoke and steam; RealLensFlare predictably does lens flares; and LumaObject will convert MAX objects into light-emitting MAX objects.						
Art.lantis Renderer 3.5	PC/Mac	£494	Gomark	020 7371 7930	4	40
A rendering program featuring fast raytraced previews. The new version includes camera animation capabilities on top of the normal lighting and shading controls.						
Creature Creator 1.51	PC	£various	Graphics Domain	01494 515 500	3	36
This is a plug-in with versions for LightWave, 3D Studio MAX and Maya. Make creatures in a separate window by choosing body parts and building them a la Frankenstein's monster. A touch buggy.						

Name	Platform	Price	Company	Telephone	Stars	Iss
ZBrush	PC	$585	Pixologic	www.pixologic.com	4	43
This painting package has a unique 3D twist, thanks to PIXOL technology that gives each pixel Z-depth. This means that lighting effects can be altered after the pixel has been placed, although objects cannot be rotated.						
Piranesi 2.0	PC	£529	Informatix	01223 363 014	4	40
Named after a 16th Century artist, Piranesi is ideal for architectural designers. It enables you to texture and manipulate rough models to come up with astounding looking buildings, full of atmosphere.						
Cloth Reyes 2.2	PC	£n/a	n/a	n/a	4.5	34
This does for 3D Studio MAX what Cloth does for Maya. Modify the clothing of your characters with settings for creasing, flowing and flexibility. Sadly no longer officially available, but you might find it second hand..						
MetaReyes 5	PC	$n/a	n/a	n/a	4	34
With this metaball modelling plug-in you can bring your own organic forms into 3D Studio MAX. Build complex forms from a series of simple muscles. It's fast and convenient. Again, no longer officially available.						
Lightscape R3.2	PC	£646.25	Autodesk	01483 462 620	4	36
Powered by a radiosity renderer, Lightscape is ideal for visualising buildings and architecture. A huge selection of real world materials is included to boost realism. It's slow but powerful.						
PiXELS:3D 3.5	Mac	$699	Pixels Animation	www.pixels3d.com	4.5	43
Huge improvement over the already impressive 3.2 version, this is a high-end modelling and animation tool at a mid-range price. A bit odd, but full of new features including NURBS, IK and expression morphing.						
Under £12,000						
KineCapture	PC	£816	MCC	01332 812 938	3.5	31
This 3D Studio MAX plug-in brings you the opportunity to use motion capture data in your animations, using video clips as your motion source. A good understanding of IK is essential.						
Picza	PC/Mac	£1,169	Patrick Thorn & Co	01784 466 474	4	32
This isn't strictly speaking software, but it's worth considering if you want to scan in small objects from the real world for use as 3D models. 3D scanners used to cost £20,000 or more. This one's yours for a grand.						
Character Studio 2.1	PC	£1,169	Discreet	01483 462 600	4.5	32
The most widely used character animation plug-in for 3D Studio MAX. It boasts a hefty price but adds due functionality with Biped and Physique modules. Think Dancing Baby and you're there...						
form·Z 3.5	PC/Mac	£1,756	Gomark	020 7731 7930	4	42
The latest release of this NURBS object creator has had most of the early bugs ironed out, and comes with an improved licence for use over multiple machines. Much more user-friendly modelling than before.						
solidThinking 3.5	PC	£TBC	TBC	TBC	4.5	39
This upgrade to Gestel's star NURBS modeller concentrates on support for polys, Subdivision Surfaces, Surface and Curve Tangency Align. A new UK distributor is currently being appointed.						
MatchMover	PC	$5000	Keoti	020 7482 4858	4	41
For matching 3D CGI up with 2D real world footage. Calculates 3D co-ordinates of 2D features and exports them as a motion path in any major format – for 3DS MAX, for instance. Unique and brilliant.						
FAMOUS Faces	PC	$6,250	Beam International	00613 9866 8300	4	31
This application combines motion capture and key frame animation and keeps it simple while controlling the results. Trouble is, you need to get motion capture data in order to use it.						
Mirai NT	PC (NT)	£5,869	Techex	01628 777 800	4.5	35
Real-time polygon-based program for modelling, rendering and animation, plus 3D painting. It always works in closed solids so you don't have to worry about uneven edges. Streamlined interface.						
Houdini 4.0	PC	£10,950	Techimage	01367 253 868	4.5	41
Version 4 of the top-end 3D system has a more streamlined interface, new shader options, a Vector Expression Language, interactive polygon reduction tools and subdivision surfaces, and a move to Linux.						

...materialising soon





Hardware *[Buyer's Guide]*

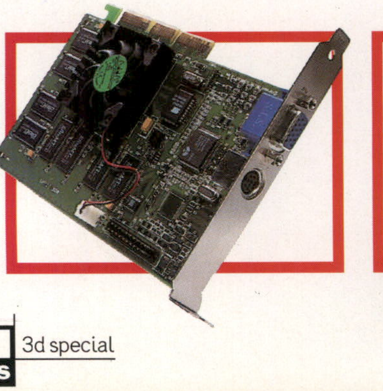
From the *Computer Arts* archives, we present our essential guide to the very best 3D hardware available right now, from graphics cards priced at less than £150, to SGI systems for over £30,000…

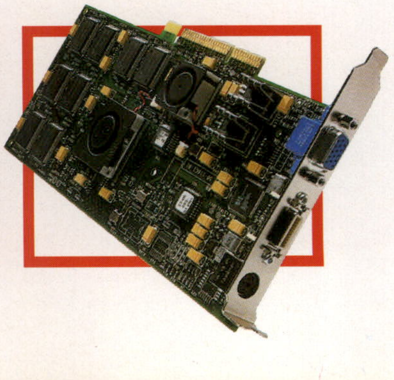
3D hardware reviewed in Computer Arts

Name	Platform	Price	Company	Tel/Web	Stars	Iss
Graphics cards						
Voodoo3 3000	PC	£149	3dfx	020 7544 6812	3	35
Latest Voodoo chipset offering, using 3dfx's Glide API, popular with game coders. Faultless Photoshop, but OpenGL only for gamers as far as we could establish. Also, it only offers 16-bit colour in 3D.						
3D Blaster Annihilator	PC	£170	Creative Labs	0118 934 4322	4.5	40
An amazingly cheap, amazingly fast 3D card from Creative with a terrible name, that's excellent for 2D, too. The Annihilator isn't aimed at the graphics pro, but don't let that put you off because it's based on nVidia's brilliant GeForce 256 chipset. The drivers are excellent, with support for OpenGL, Direct3D and DirectX 7.						
3D Blaster TNT2 Ultra	PC	£179	Creative Labs	0118 934 4322	4	35
Aimed primarily at gamers, but if 2D is your core, you could certainly do much worse. The TNT2 benchmarked faster than some of the high-end cards, showed excellent Photoshop performance and supports OpenGL.						
Mactell Vision3D Pro II	Mac	£218	Channel Dynamics	0870 607 0540	2	36
An OEM version of the ProFormance II 80, based around the older imagine 128 processor. 8MB VRAM on-board and 250MHz RAMDAC – slower than the ProFormance III, but it outstripped the Rage 128 in Photoshop.						
Formac ProFormance III	Mac	£230	Formac	020 8533 4040	5	36
This soundly trounced the other Mac graphics cards in our tests, with its 128-bit Permedia III chip. It performed the Photoshop scroll test in just seven seconds, and achieved 29fps in a Gerbil 3D benchmark.						
3D Labs Oxygen VX1	PC	£235	3D Labs	01784 470555	5	35
It has benchmarks behind the TNT2, but apply the VX1 to rendering and you'll see the difference. It offers up to 2048x1536 res, virtual texturing and per-pixel lighting, plus excellent software. Ideal for a serious beginner.						
ATI Nexus 128	Mac	£270	ATI	01628 533 115	3	36
The Nexus wasn't shipping at the time of testing, so we used the blue G3's Rage 128 as a guide – same Rage 128 GL, 250MHz RAMDAC and 16MB VRAM. It's a bit slow – 12 seconds on the Photoshop tests.						
Erazor X²	PC	£289	Elsa	08000 563 445	4.5	42
Based around nVidia's GeForce 256 chip, this is the fastest consumer card on the market,outperforming those costing three times as much in our tests. This lightning speed is thanks not only to the top-of-the-range on-board processor, but also to AGP 4X support and 32MB of Double Data Rate RAM.						
Lightning 1200	PC	£552	Mentor	01462 814 000	3	35
Only NT drivers available, but the Lightning shows stunning OpenGL performance – but it still only just pips the £180 TNT2. Also, its maximum res in true colour is 1280x1024. A great card, but slightly overpriced.						

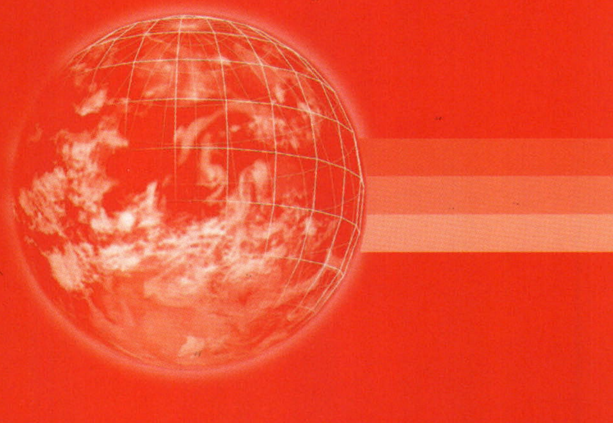
Name	Platform	Price	Company	Telephone	Stars	Iss
Elsa GLoria II-64	PC	£700	Elsa	08000 563 445	4	42
With 64MB of SDRAM on-board, this card can comfortably handle large amounts of data with ease, maintaining 35fps with a whacking 73MB of textures. Based on the Quadro chip, big brother to nVidia's GeForce 256, its compact design makes this easy to fit, and there's a six-year warranty for added comfort.						
3D Labs Oxygen GVX1	PC	£764	3D Labs	01784 470555	5	35
The cream of the crop when we tested it, the GVX1 handles all OpenGL processing on-board – you can even put extra lights in a scene and barely see the impact on performance. Otherwise near-identical to the VX1.						
Systems						
iMac DV SE	Mac	£1,199	Apple	0870 600 6010	4	41
Our top-of-the-range test model boasted 400MHz G3 chipset, 128MB RAM, 512K backside cache, slot-loading DVD-ROM drive and movie player. It also has ATI Rage 128 graphics, a 15-inch monitor and two Firewire ports, plus support for Apple's Airport technology. Small and pretty fast.						
G4 400	Mac	£1,291	Apple	0870 600 6010	4	38
Damned fast and good looking too, the new Mac G4 is a hit. A translucent graphite grey and silver casing stows a 56K modem, two Firewire ports and two USB ports. But you also get the mini iMac keyboard, which lacks some keys and much the same G3 motherboard. Our review model also had 64MB RAM and a 10GB HD.						
Movie Studio DV500	PC	£2,290	Evesham Micros	0800 0380 800	4.5	41
A 500MHz Pentium III with 128MB RAM, 17-inch Taxan Ergovision, Matrox G400 graphics, Pinnacle DV500 with Firewire and DVD-RAM drive. This is fast, the DV card is great and integrates well with the bundled Premiere 5.1 and Impression. Really is excellent value for money.						
AP250 Workstation	PC	£4,141	Compaq	0845 270 4222	4.5	42
A great choice for a 3D workstation at a fraction of the cost of an Intergraph or SGI system. A blisteringly fast 733MHz Pentium III sits on Intel's 820 chipset with AGP 4X and 133MHz FSB. Despite oversights such as the small hard disk and lack of Jaz drive or CD writer, the Oxygen GVX1 graphics boost this way above average.						
SGI 540	NT	£30,056	SGI	07000 320540	3.5	38
Incredibly fast and almost as good looking as the G4, is SGI's 30-grand 540 Visual Workstation with four 500MHz PIII Xeons, 8MB cache in all and 2GB RAM. Excellent display and graphics are supplied by a Cobalt chipset, hardwired to the motherboard. But such a spec does not come cheap…						

(from left) The 3D Blaster TNT2 Ultra is aimed at gamers but showed great *Photoshop* performance. The SGI 540 is the Lamborghini of workstations with a price tag to match, while the Mac G4 400 is a more affordable alternative. The Voodoo 3000 only offers 16-bit colour in 3D.





...a new destination



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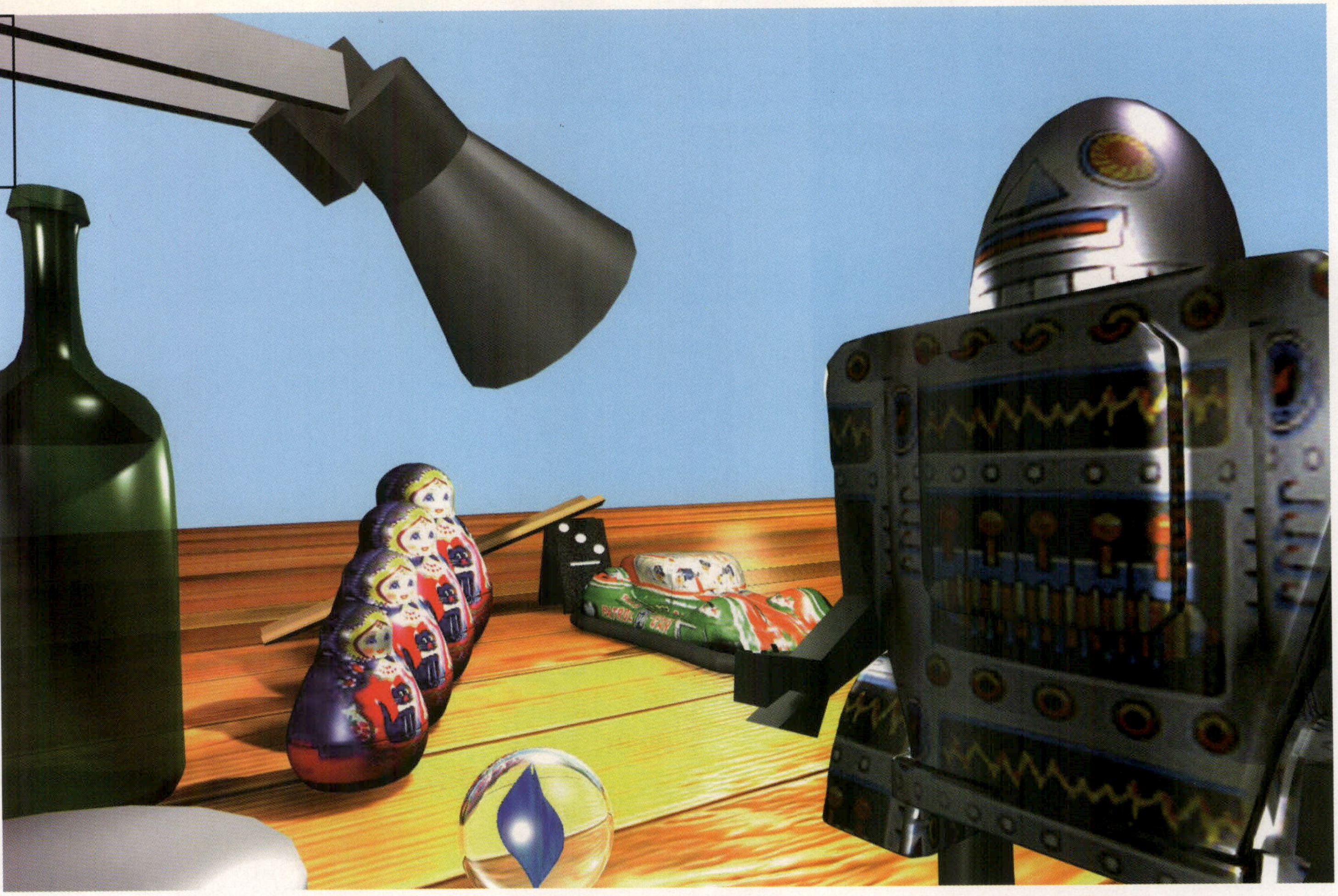
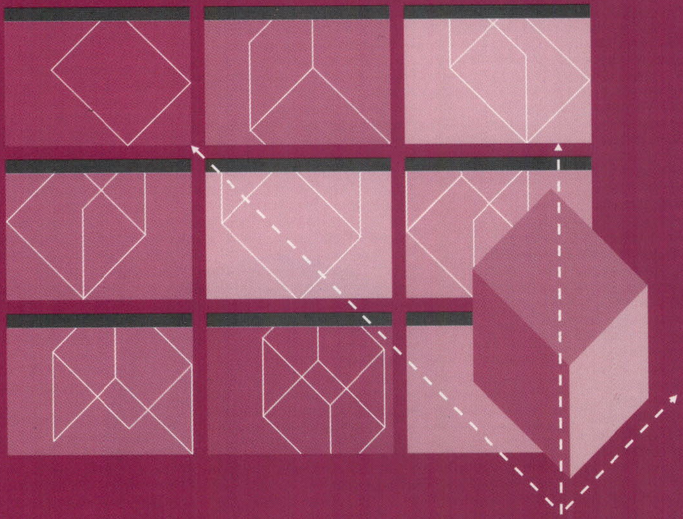


Illustration: Christian Darkin

Animating in 3D Studio MAX



It boasts the most powerful animation tools around, so discover how to make the most of them and bring toys to life in our walkthrough

Popular package 3*D Studio MAX* has a very powerful set of animation tools for a desktop program. However, with such a range of options it's easy to get lost. We're going to use a collection of different techniques to put together our own scene by animating some toys (now there's an original idea).

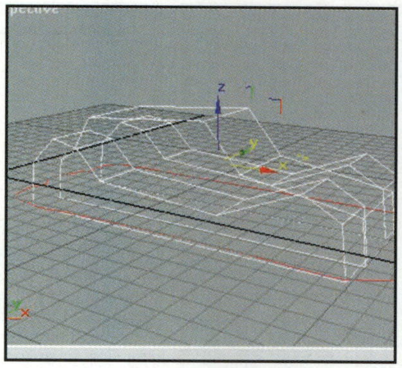
We're going to begin with a toy car, zooming around a table top. The car collides with a domino, which sets a marble rolling down a ruler. The marble rolls into a clockwork robot, which walks off across the table, attracting the attention of an angle-poise lamp. The lamp accidentally knocks over a wine bottle, spilling its contents all over the table and forcing a family of Russian dolls to take refuge.

We'll be using paths, bones, dynamics, particle systems, and sub-object animations along the way, and you can find the finished animation on the coverdisc.

Child's play
Words and expertise supplied by
Christian Darkin
[e] christian@darkin.demon.co.uk

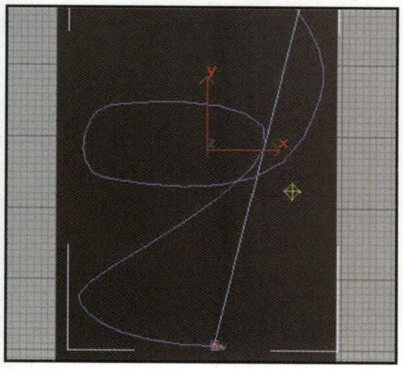
Part 1: The car

Our first job is to send the toy car off around the table. We could just create keyframes for it, by turning on the animate button, and moving it to different positions at different times. However, instead we're going to create a path, and have the car follow that

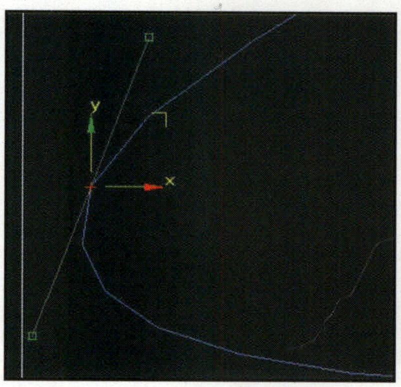


1 Our first job is to design the car. We're using quite a simple shape, constructed by taking some extruded lines, joining them together, and then applying a Mesh Smooth modifier to create rounded edges.

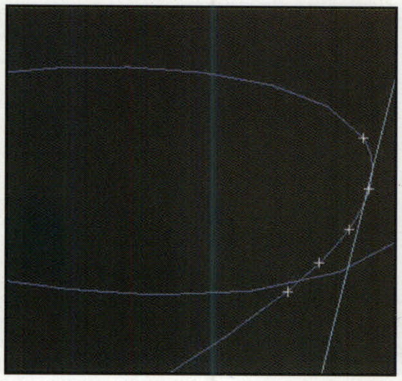
2 The car was built in two parts which can be animated together or separately. We want them to animate together, and the easiest way to do this is to make them into a group. This works for most, but not all types of animation.



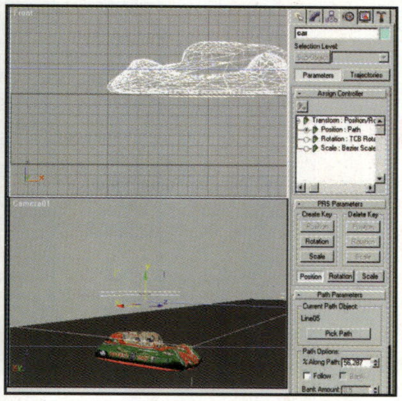
3 Now we have to create a path for the car to follow. Use the Spline tool to draw a line. Using Bezier curves gives the path smooth curves. Try to make the path with as few points as possible. That way it's easier to edit.



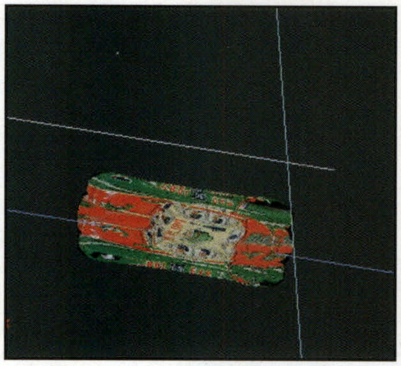
4 Clicking the Modify tab, then Sub-object, enables us to alter the position of the points after they've been created, and we can fine-tune the motion path. We can add or delete points, or alter their curvature by changing the angle and size of the Bezier handles.



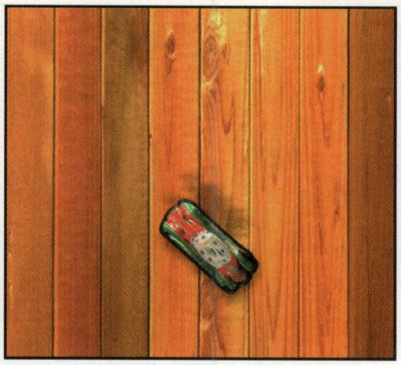
5 How far apart the points on the path are will govern the way the car accelerates and decelerates. The car will take the same time to travel between each point, so putting them close together will slow the object down, and spreading them apart will make it speed up.



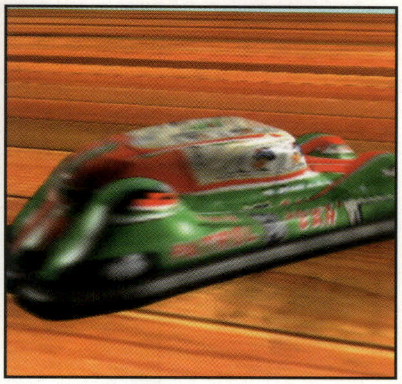
6 To make the car follow the path, we select it, then click on Assign Position Controller in the Parameters section of the motion tab. This gives us a rollout from which we can pick the path we want our car to follow.



7 Right now, the car follows the path, but it doesn't orient to it. In other words, the car moves around the corners, but always faces in the same direction. To solve this, click Follow in the path parameters rollout. If this were an aeroplane instead of a car, we could also click Bank to make the craft bank as it turned.



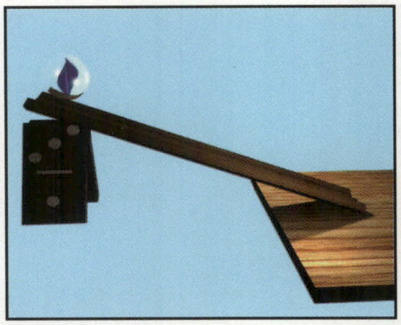
8 We can now see the way the car travels by clicking Play. *3D Studio MAX 3* provides a quick way to alter animations by providing keyframes as dots below the timeline when the keyframed object is selected. By dragging the end keyframe, you can change the overall length of the journey – speeding it up or slowing it down.



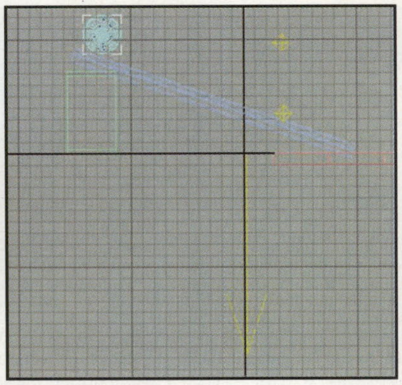
9 Finally, we want to film the animation. To accentuate the car's motion, we create a target camera pointing at our car, and use the link tool to link the target to the model. Now when the animation plays, the camera always turns to watch the car.

Part 2: Marble dynamics

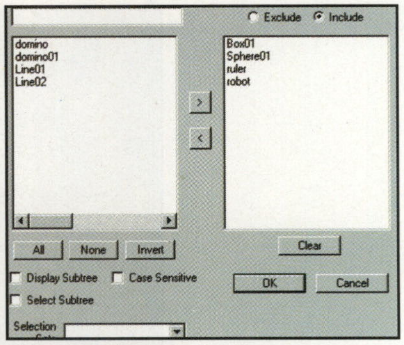
When the car reaches the end of its path, it should send a marble rolling down a ruler. This could be modelled using keyframes, but it would be complex. Instead we'll use *MAX*'s simulation tools. *MAX*'s dynamics are a bit shaky, but still usable



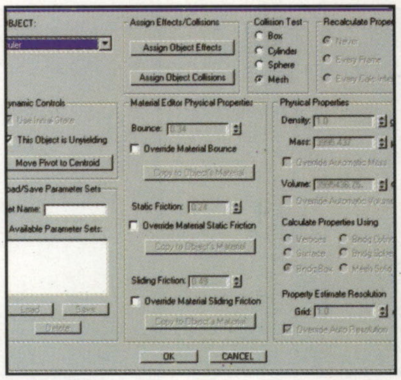
1 First we have to set up our situation. Our marble is balanced at the top of the ruler, waiting to be set in motion. At the bottom, we've placed a simple block which will stand in for a much more complex object we'll be designing later which the marble will bounce off. Right-clicking on the stand-in object, we make it non-rendering.



2 We also create a gravity space warp. Gravity is an essential part of most dynamics simulations, but we don't need to bind any objects to it – the dynamics utility will do all that for us.



3 Now we go to the tools tab, and create a dynamics simulation. Our first job here is to pick the objects we want to involve in the simulation. All we really need is the ground plane, the marble, the ruler, the gravity warp, and the 'stand-in' object.


OBJECT:
ruler
Assign Effects/Collisions
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Assign Object Collisions
Collision Test
○ Box
○ Cylinder
○ Sphere
● Mesh
Recalculate Prope
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○ Every Frame
○ Every Calc Inte
Dynamic Controls
☑ Use Initial State
☑ This Object is Unyielding
Move Pivot to Centroid
Load/Save Parameter Sets
Set Name:
Available Parameter Sets:
Load
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Material Editor Physical Properties
Bounce:
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☐ Override Automatic Volume
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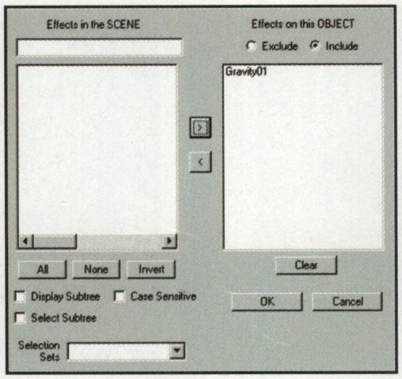
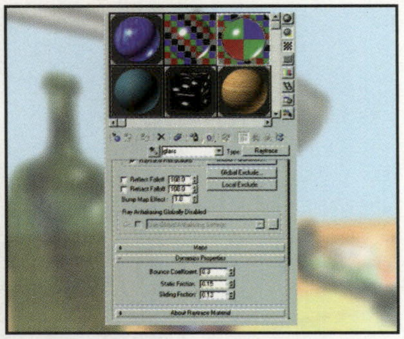
○ Vertices
○ Surface
● BndgBox
Property Estimate Resolution
Grid:
☑ Override Auto Resolution
OK
CANCEL

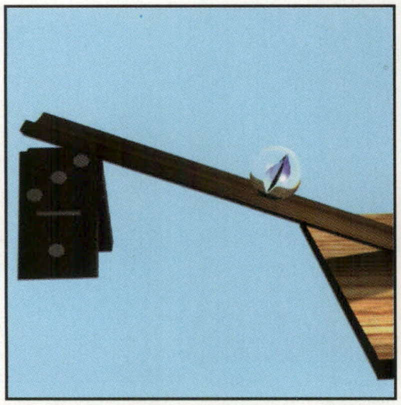
4 Next, we need to set up how our objects will behave. Clicking Edit Objects, we make the ground plane and ruler Unyielding so that gravity and collisions do not affect them. We then click on collisions for each object, and choose which other objects we want to check for collisions with.



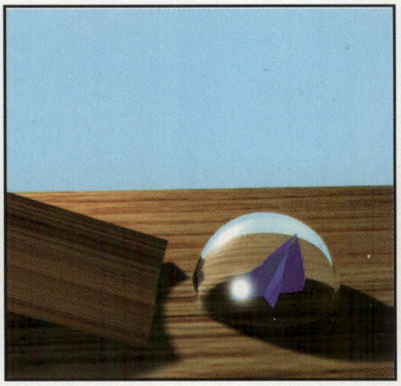
5 We now click Effects for the marble only, and bring the gravity warp in to affect only that object. It's possible to use global values for collisions and effects, but there's no point having the computer spend time working out interactions which we know are never going to matter.



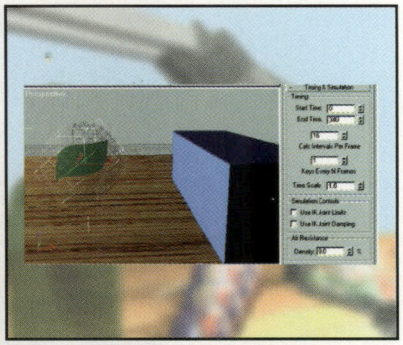
6 Different materials will react differently as they bounce off or roll over other materials. That's why we now have to go to the materials editor, and set the dynamics properties for the materials in our scene. The most significant is Bounce which sets the percentage of energy lost in a collision (1 means no energy is lost, 0 means it's all lost and there's no bounce). We set ours at about 0.4.



7 We can now return to the dynamics rollout, set the range of the animation, and click Solve. *MAX* then goes through frame by frame calculating how the objects move (tip: turn off Update Display with Solve as it slows things down a lot).



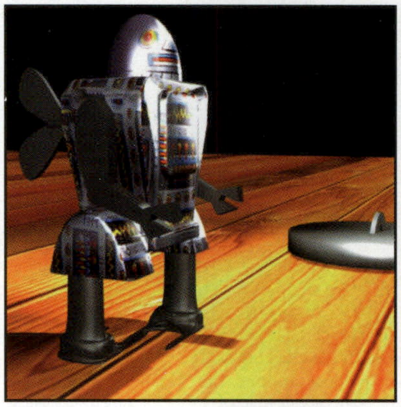
8 Our simulation doesn't work. The marble falls through the floor, and doesn't bounce right. The bounce is easy to improve – editing the dynamic properties of the marble, we click sphere instead of bounding box for the collision detection – this stops *MAX* treating the marble as a square block!



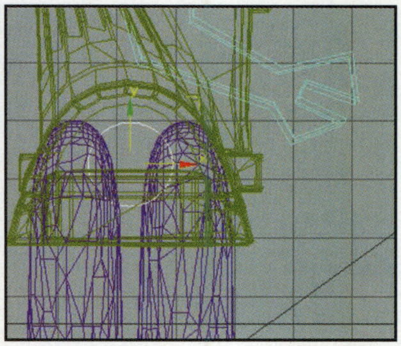
9 The other problem is more tricky. *MAX*'s dynamics has bugs in it, but there are a couple of ways around them. The first is to increase the samples per frame value – the second is to change the collision detection for all objects to Mesh, and use a tessellate modifier to increase the polygons in each object. This makes the simulation much slower, but more accurate.

Part 3: The walking robot

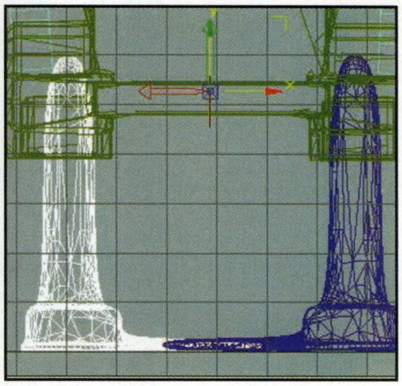
As the marble rolls, it hits another toy – this time a clockwork robot. The motion is more complex here, and there are several different aspects to consider. The robot's feet need to move. Its body must move across the table, and the key must unwind as it walks



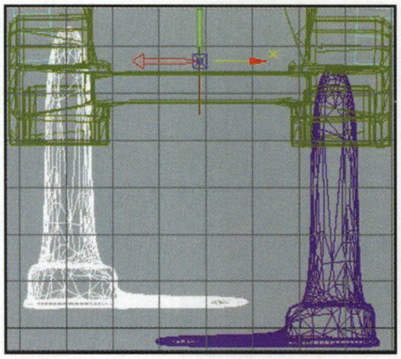
1 The robot is a tin toy made in four separate parts – the key, the body and the two legs are separate objects, but are grouped together.



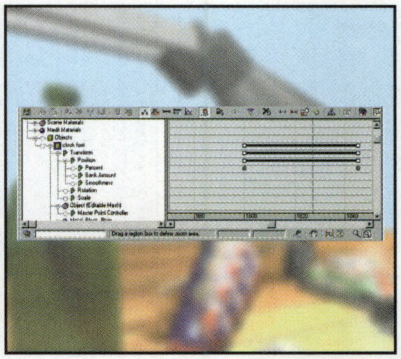
2 We want the legs to move as though they're both attached to points on the edge of a spinning wheel – so that one is up while the other is down, and they keep the toy moving forwards. Between the legs, we create a circle, which will become our motion path.



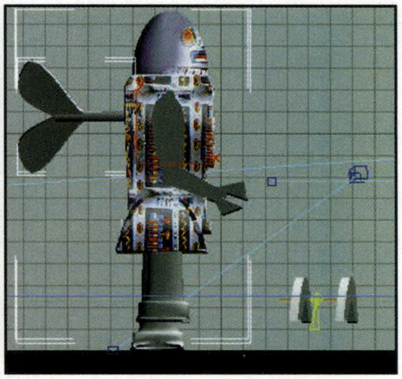
3 We now click the Hierarchy tab, and alter the pivot points of the legs so that they're on the edge of the circle. This will keep the legs in place as they rotate around the circle.



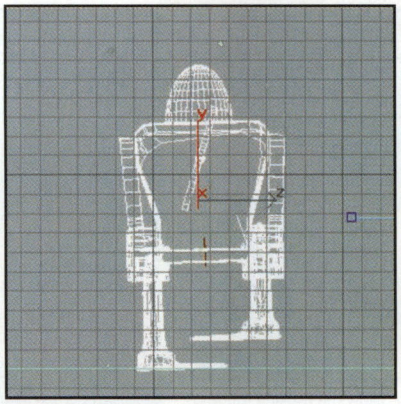
4 Now we apply the path controller in the same way we did with the first walkthrough, only we don't make the legs rotate to follow the direction of motion – they simply move around the circle whilst pointing downwards. One leg must start at 0 per cent around the path while the other is set to 50 per cent so they're always at opposite sides of the circle.



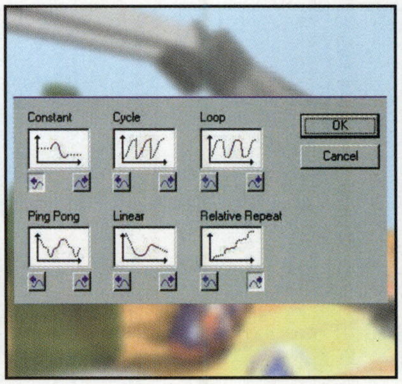
5 By default, the rotation takes the length of our animation to complete – below the time slider, we can see keyframes for the start and end of the rotation. We want each rotation (each step the toy takes) to last about two seconds, so we simply drag the keyframes closer together. You can work more finely with the keyframes by switching to track view.



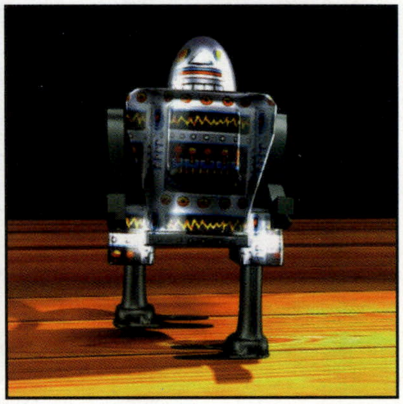
6 Now it's time to create the forward movement for the robot. We group all the elements together, then turn on the animation button. Now we can step through the rotation of the legs, and create keyframes by positioning the robot's body so its feet remain in contact with the ground.



7 While we're at it, we introduce a slight rocking motion to the robot so it appears unsteady – rocking back and forth as it walks. Playing through the animation, it looks good, but there's only one step. We need the robot to keep walking.



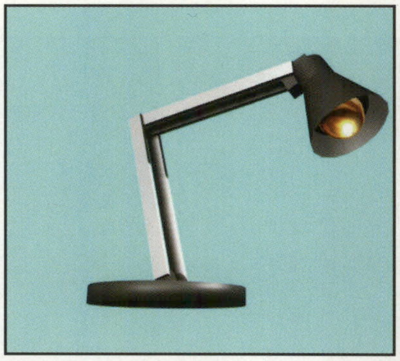
8 Switching to track mode, we select the tracks governing the motion of the legs and body. We now click the Out of Range button. The graphs show various ways of continuing the motion before and after the range of keys we've created. We click Relative so that the robot walks forward forever.



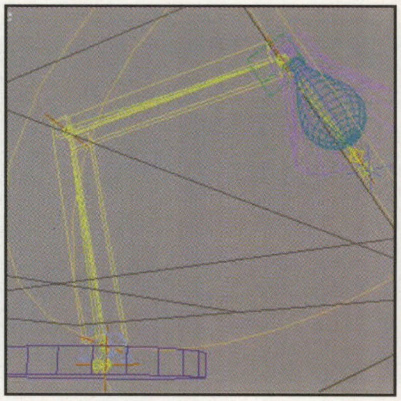
9 Finally, it's a simple matter to create keyframes to rotate the key in the robot's back. You can either click Continue Out Of Range again to loop the key spinning motion, or create more keys if you want to make the key slow down over time.

Part 4: The mandatory lamp

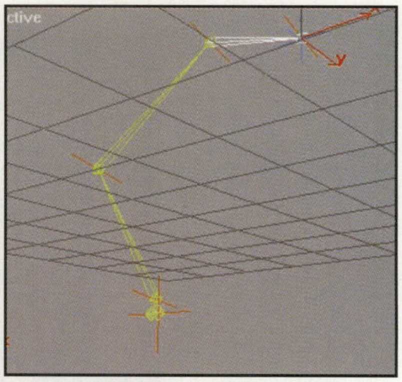
Of course, no self-respecting animation is complete without an angle-poise lamp. Ours will follow the walking robot, look around, and eventually knock over a bottle of wine



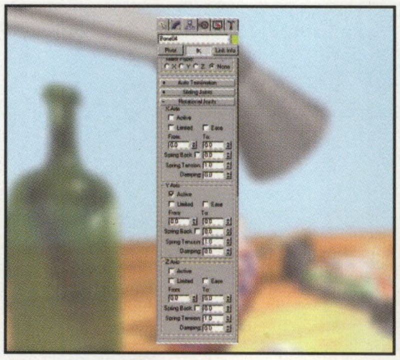
1 The lamp is simple enough to build out of basic primitives. What's tricky is placing the pivot points for each jointed section at the right place so that when it tilts, the lamp doesn't appear to come apart. We position an omni-directional lamp just in front of the bulb, and link it to the head so they move together.



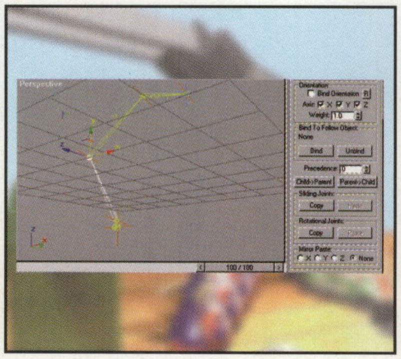
2 Next, we create a simple bone structure. The lamp's bones are the points about which it bends, so we place the first in the base, and one at each pivot point. The final bone is positioned just in front of the bulb – where we placed *MAX*'s light.



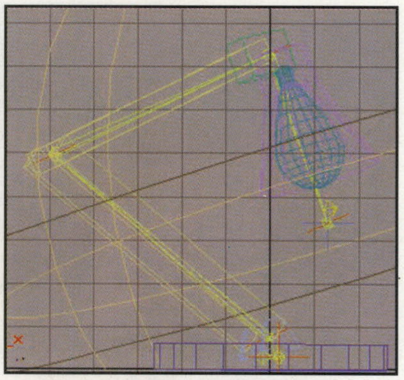
3 *MAX* automatically creates an End Effector at the final bone. This is the key to easy animation of boned structures. Put simply, the end effector is all you ever move in an animation. Drag this around, and you'll see the rest of the structure flex and bend to follow.



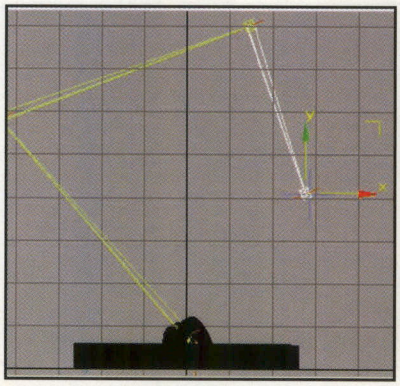
4 Using End Effectors gives you less control over the way bones move than traditional animation does. If you want to control actions more strictly, you need to use the IK section in the Hierarchy tab to set limitations for the rotation of each bone. You can, for example, limit an elbow joint so that it won't bend backwards.



5 We set our lamp so the base can rotate horizontally, the elbow can move vertically, and the head can turn to look in any direction. There are a lot of extra settings you can make, but with a bone structure as simple as our lamp, it's not necessary to worry too much about creating realistic organic joints.

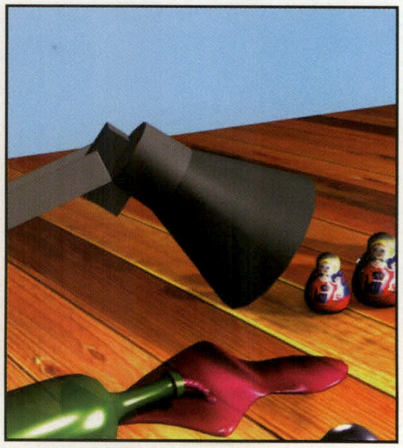


6 The next step is to use the link tool to bind each element of the lamp to the relevant bone. You can check that you've connected the right parts to the right bone by simply dragging the end effector. The lamp should now bend and flex with the bones.



7 Our lamp is quite a simple structure, but it's often a good idea with more complex models to use *MAX*'s Hide function on the actual mesh of the object while you're animating. With only the bones visible, you can see the result of your animations in real time.

8 To make the lamp follow the walking robot, we could simply bind the End Effector to follow the robot. However, this can create a rather pedestrian animation. Instead, we create keyframes for the end effector, dragging it around to build a more interesting sequence.

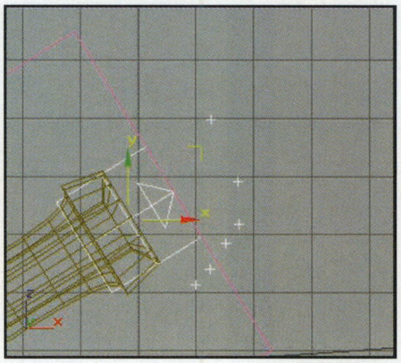


9 With the animation rendered, we can see that the lamp moves realistically, and the light shining from it moves with the lamp.

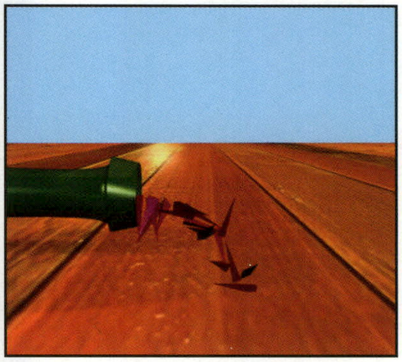
Part 5: Liquid

As the angle-poise lamp swings around to get a better look at the walking robot, it knocks over a wine bottle, causing the contents to spill over the table. Animating fluids can cause a few problems – luckily, *MAX* has some useful tools up its sleeve

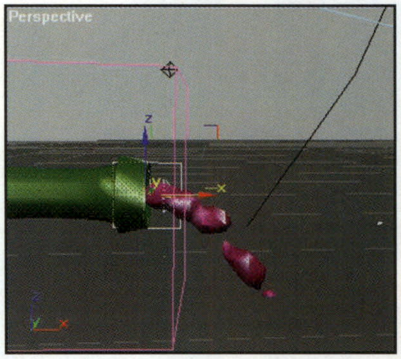
1 Animating the falling bottle is not that tricky – moving its pivot point to the bottom right corner is the key. That way, when you rotate it, it will tip rather than just spinning. We put an extra keyframe in when the bottle is half way over, and altered the Ease In and Ease Out values to 25 so that it tips slowly before crashing to the ground



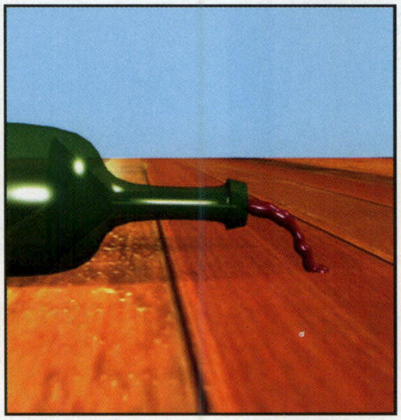
2 The next step is to provide some wine. We create a super-spray particle generator in the top of the bottle, and set it to a low flow rate. The spray should be timed to begin as the bottle tips, and linked to the bottle so that they move together.



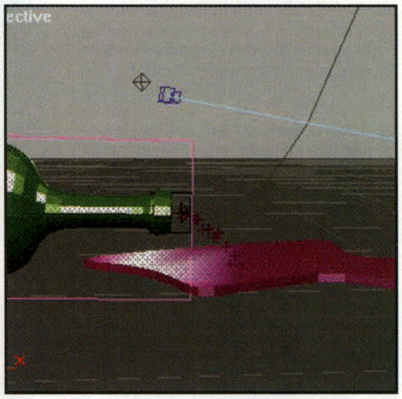
3 Next we create a gravity space-warp, and bind the spray to it so that the particles are dragged downwards as they leave the bottle. Rendering this shows an interesting effect, but the particles aren't that much like liquid.



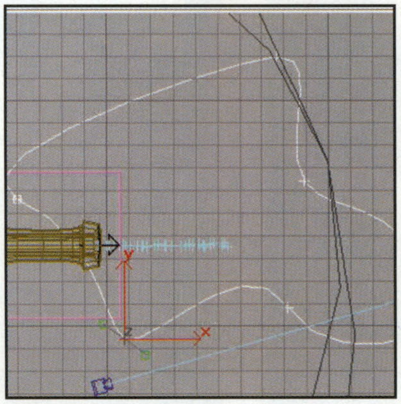
4 In the Particle type Rollout, click meta-particles. This creates particles which stick together like droplets of liquid. You may have to experiment with the flow rate and size of meta-particles depending on the scale you've created your models at. Meta-particles can take a while to calculate and render, especially if there are a lot of them.



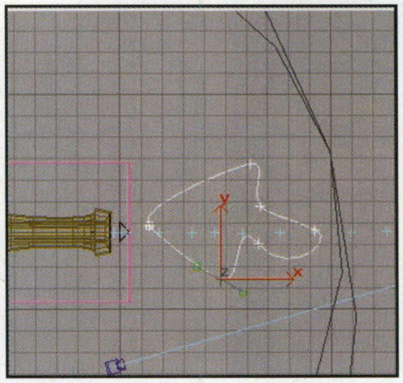
5 Wine should now be flowing freely from the bottle, but it's not having any effect yet. The liquid simply drops through the table and out of sight. The pool of wine has to be created separately.



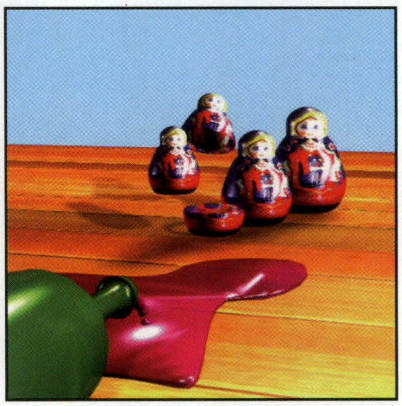
6 For this, we cheat. We create a spline using Bezier curves to mimic a pool of water, and add extrude and smooth modifiers to it so that it appears rounded. We then map on to it the same material we're using for the wine.



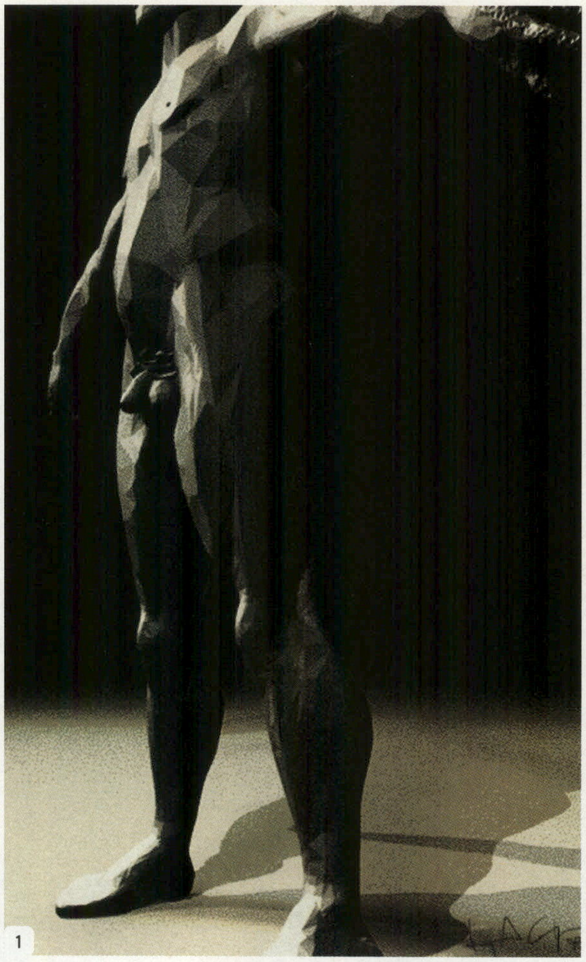
7 Next we go back down the modifier stack, to the line item, and click Sub-object so we can edit the shape of the spline. Now we turn on animation, and begin to edit the shape and size of our pool of liquid.



8 Moving to the keyframe where the wine first starts to spill, we make the shape very small. Now, we set keyframes every couple of seconds, moving the points that make up our curve further and further out. We change the shape of the pool as it moves to simulate irregularly flowing liquid.



9 Finally, we move back up the modifier stack, to see the results of our animation. *MAX* retains the keyframes that were set at the sub-object level. To see the results of our finished animation, check out toys.mov on the coverdisc.



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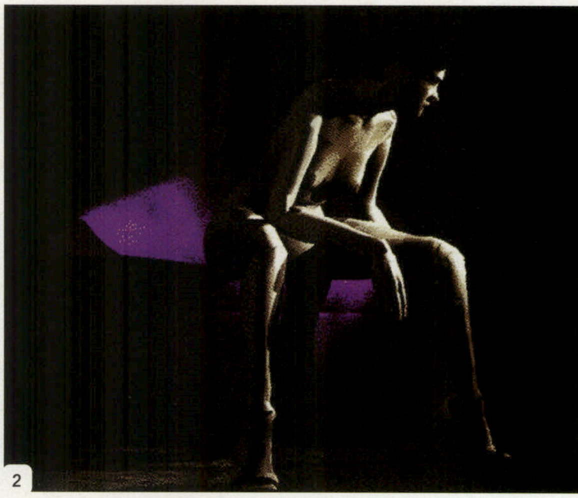
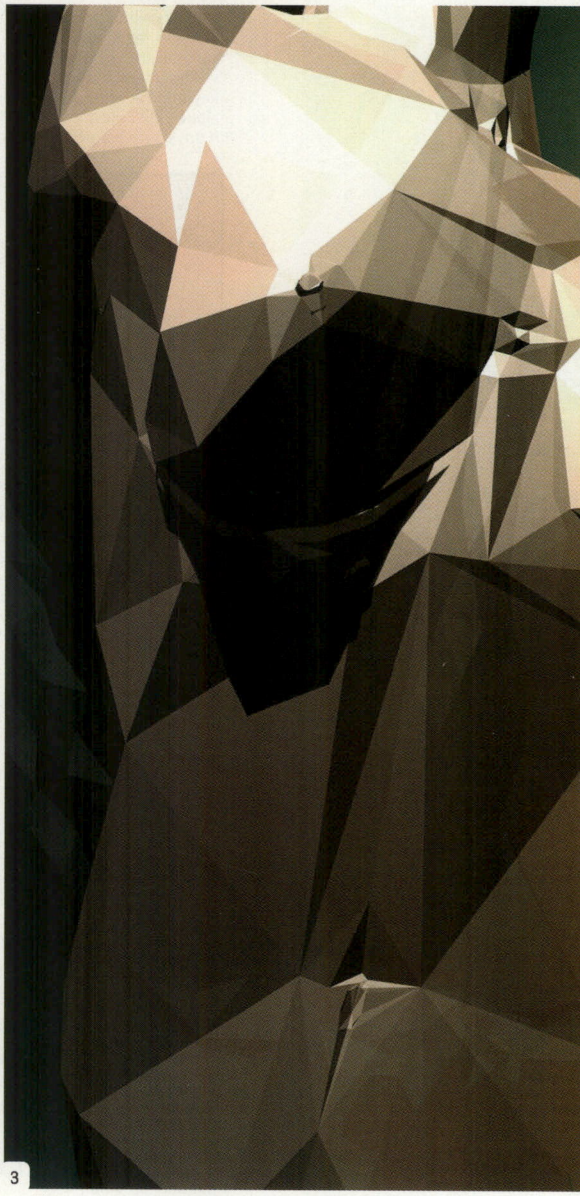


2

1. Jeremy created this picture as a figure study. He used *LightWave* and image maps to "explore the figure in polygonal mesh".

2. "These two images are colour and composition studies for as yet unfinished images and animations," Jeremy explains. "I'm interested in the mocap models used in trade shows and adverts. They always have these girls bound up in these mechanical outfits – it's kind of weird really." To animate the figure, Jeremy used some existing mocap data. "It's very rough, there are a lot of pops and sliding and joint mismatches, but I like it that way…"

3. This is another of Jeremy's low polygon images. "This image also plays on the notion of representation, what is real and what is not," he says. "The figure could seem solid, with its chiselled angularity, except for its transparency, which betrays it as a whisper, an array of infinitely thin polygons."



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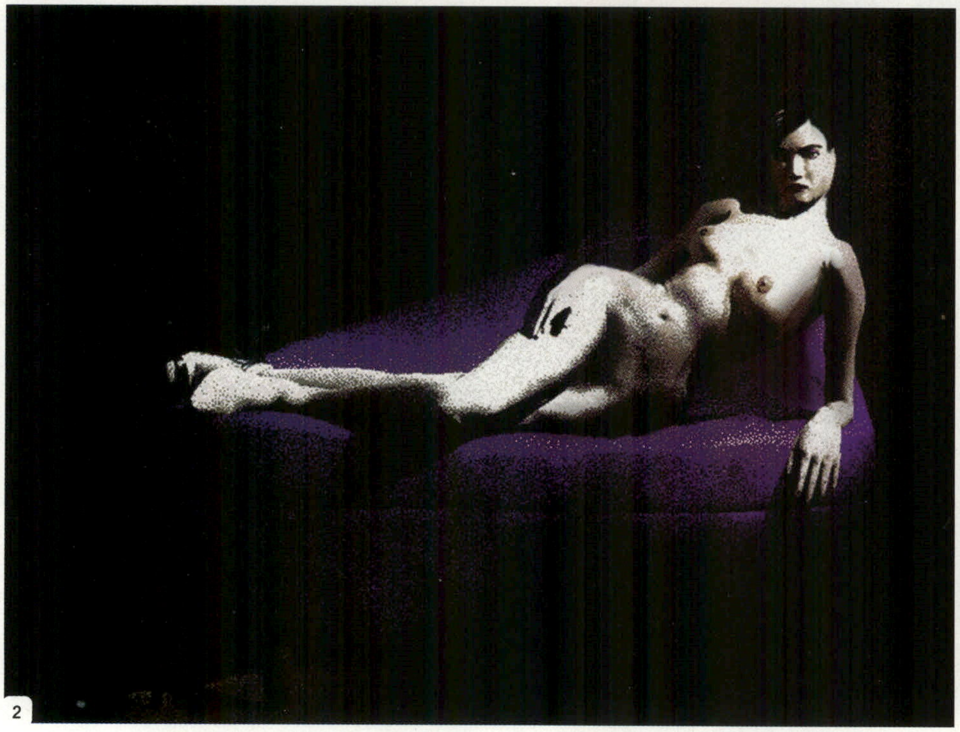

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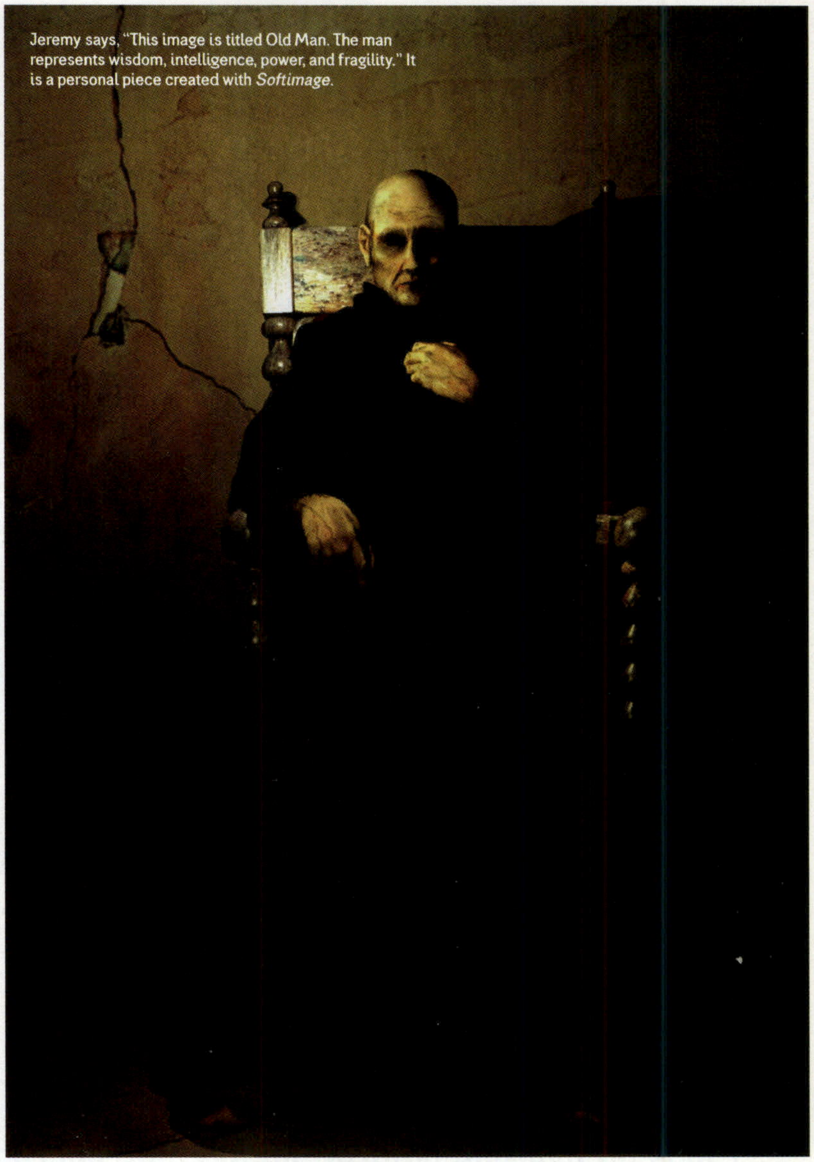


Jeremy says, "This image is titled Old Man. The man represents wisdom, intelligence, power, and fragility." It is a personal piece created with *Softimage*.

Jeremy A Engleman

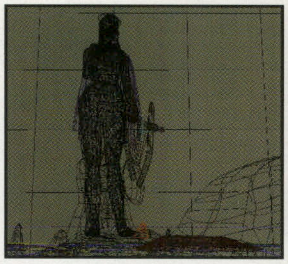
Artist Jeremy marries modern 3D with the discipline of traditional painting, while remaining *"a sucker for the latest hardware..."*

Like so many digital artists, Jeremy Engleman started life as a traditional one. However, he has maintained a traditional 'painterly' 2D style in his 3D work that is rare. This distinctive look has brought him exhibitions and accolades, not to mention a cornucopia of work for clients such as Penguin, Evans and Sutherland, Cyan Inc, Corbis, and Sony.

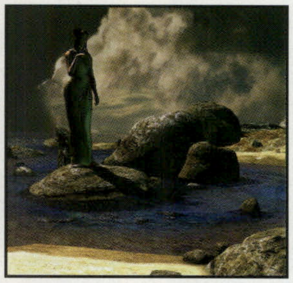
Jeremy is currently working on the models for a Sega Dreamcast version of an upcoming Sony PlayStation *Star Wars* title. Although you might not immediately associate his illustrative style with games, he has also worked on *Vigilante 8* for the PlayStation and *Riven*. Plus multimedia titles such as Peter Gabriel's *EVE* CD-ROM and Corbis' educational Leonardo da Vinci CD-ROM.

Sappho at the Whark Rocks

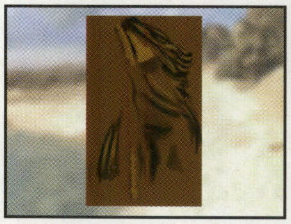
Sappho at the Whark Rocks is one of Jeremy's favourite images, he says. "It combines many elements and ideas into one composition. It is a play on new worlds and old mythology, on new image-making technology and old techniques. It is about questioning history and contains a strange juxtaposition with a modern setting. Sappho, a seventh century BC lyric poet, is represented atop the rocks which she, according to popular legend, hurled herself on after being jilted by a lover. These rocks are actually the Whark Rocks from the game *Riven: The Sequel to Myst*."



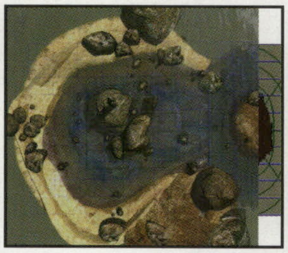
1 In the wireframe, you can see that polygons were used to model both the figure and the cloth as opposed to NURBS or splines. This is because polygons often offer that extra (forgive the pun) edge of control. Surface detail is much sharper, crisper, and often has more character than splines, which can be too smooth.



2 Here is a very early render, containing early models and before any of the compositional details were worked out. The image is static and there is really no sense of unity as an image. By comparing this image to the final one, you can see what a vital role composition plays in a successful image.



3 Much of the detail in the cloth is actually painted in both the diffuse channel and the bump map channel. The rough forms of the cloth were hand-modelled, with the large-scale folds and shapes as actual geometry, and the fine details were painted in. It is difficult and unwieldy to use geometry for the fine wrinkles in cloth – even with a cloth simulator.



4 This is a rendered top view with superimposed wireframe of the main staging area of this scene. This was used as a guide to paint in specific details, such as blends between the rocks and the lagoon floor, as well as the complex blending of the water into the wet sand into the dry sand into the rocks.

5 This is a rendered view of the scene, looking opposite Sappho. Remember to always be on the lookout for other compositions or shots. You might as well, it's a whole world you're creating. Make the most of it, smell the roses and look around.

> **"I was an average painter, an average photographer, an average sculptor – this made me perfect for 3D"**

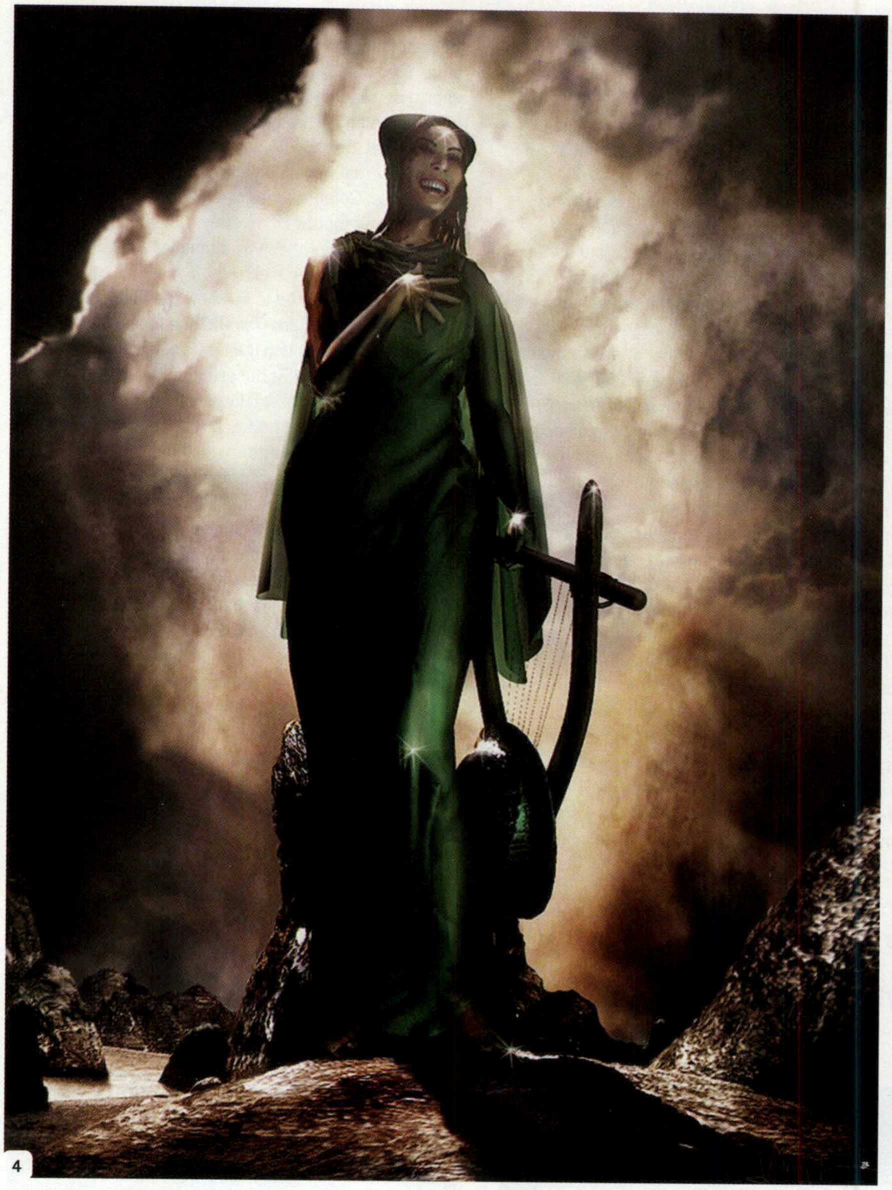
Jeremy's flexibility is a must as a freelancer, but he has other plans for the future. "I love working at home – I keep strange hours, so it suits me," he says. "However, the kinds of projects I would eventually like to do require more people, so I suppose I will get involved in a company sometime." These projects involve Jeremy's love of character design and creation. He says: "I would love the chance to get to design a far-out cast of characters and a storyline for some kind of next generation game console."

Surprisingly, Jeremy's love of 3D didn't begin with a character, but with a coffee cup. "When I was 17, I started to use the computer for image-making. I made my first 3D image using my Amiga 500 – it was a coffee cup and it took two weeks to render."

Undeterred, Jeremy enrolled at the University of Colorado, Denver, to follow a fine art degree. He says, "I wasn't really very excited about 3D at that point, but while at college I got an internship at a local video production house." There, Jeremy discovered Video Toasters and *LightWave*, and became utterly hooked. Jeremy explains: "I was an average painter, an average photographer, an average sculptor, an average systems administrator, and I even knew a touch about math and programming. This made me perfect for 3D CG – a hideous amalgamation of all these things."

However, things didn't go perfectly smoothly from this revelation. Jeremy explains, "When I was at college, there weren't any computer art classes to speak of. I think there was a basic *Photoshop* skills course – fairly useless."

Consequently, Jeremy is a self-taught artist. "What did help me was being a nerd all through grade school and being thoroughly comfortable with computers quite a few strides before the mainstream, " says Jeremy, who still happily admits to being a computer



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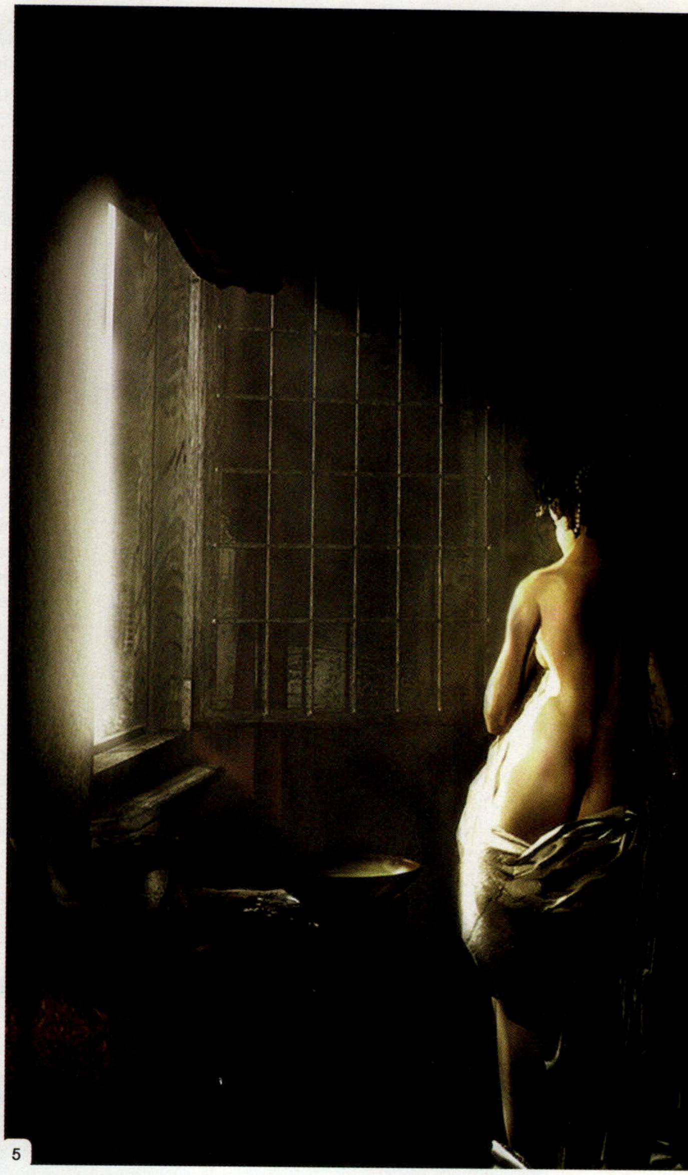

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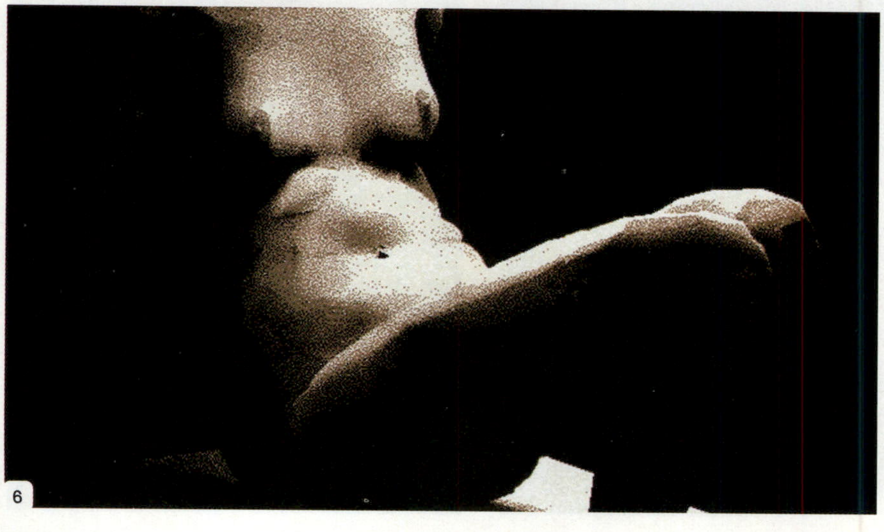


6

4. This picture is a representation of the seventh century BC lyric poet, Sappho, created in *Softimage*. "She is portrayed standing and laughing on the rocks on which she, according to popular legend, hurled herself after being jilted by Phaon," says Jeremy.

5. Another personal piece, The Bather was created in *LightWave 3D 5.0*, and took a massive 25,000 polygons. "The scene was developed in order to showcase the figure. It is built entirely in polygons, and contains virtually no texture – all detail is hand-modelled," says Jeremy.

6. This image is an exercise in 'polygon economy', says Jeremy, "I'm trying to find out what is possible with low amounts of data-small texture files and low polygon counts. It is essentially a reaction to the notion in computer graphics that the machine makes the art." This image has 620 polygons, and was created in *LightWave*.

buff, cheerfully revealing, "I'm a sucker for the latest hardware. I've just upgraded to a pretty fancy Pentium III 700Mhz with 512MB RAM." However, this doesn't mean the old kit gets slung – Jeremy's house must be over-run. "I still love older machines. I have an Amiga 1200 14MHz with 2MB RAM which I am currently working on some images on."

One area Jeremy doesn't splash out on is software updates. "I'm pretty resistant to upgrading software, and I do not care for plug-ins," he explains. "I find that almost any effect can be achieved without them." This doesn't mean Jeremy hasn't spent a fair amount of cash on software, though. He has tried almost every major 3D package you can name, and regular swaps between *LightWave*, *PowerAnimator*, *Softimage*, *Matador* and *3D Studio MAX*. "I do this to keep myself from thinking in different ways, and to avoid becoming bogged down in one software mindset," he says. "It also keeps my work from looking 'packagey', so people won't say, 'Oh, look at this *LightWave* artist' or whatever."

Jeremy's painterly style also throws people off the software scent. His classical 2D style is deceptive, and Jeremy explains how this 'look' came about. "I wanted to have some roots, some kind of solid ground on which to base my own explorations of the medium. I wanted to prove I could do something which had a basis for comparison – a yardstick so to speak. Most people in 3D do this by emulating our 'photographic reality', the notion of photorealism. But I wanted to do it through the painter's eye, because I believe, in general, that painting is closer to reality than photography."

In order to create 'through the painter's eye', Jeremy is extremely disciplined in his work, and uses careful management of the palette. He explains: "Computer generated art has the ability to introduce such a wide range of colours, with absolutely no relation to each other, that it is easy to let it get out of hand." Although this is something which can be explored to great effect, the classical look requires restraint. "Paintings, and usually the 'real world', have colours that relate and make sense. Colour serves to focus attention, dynamics and feelings. I'm really trying to make a study of this, and see how these traditional styles relate to, and inform, computer arts."

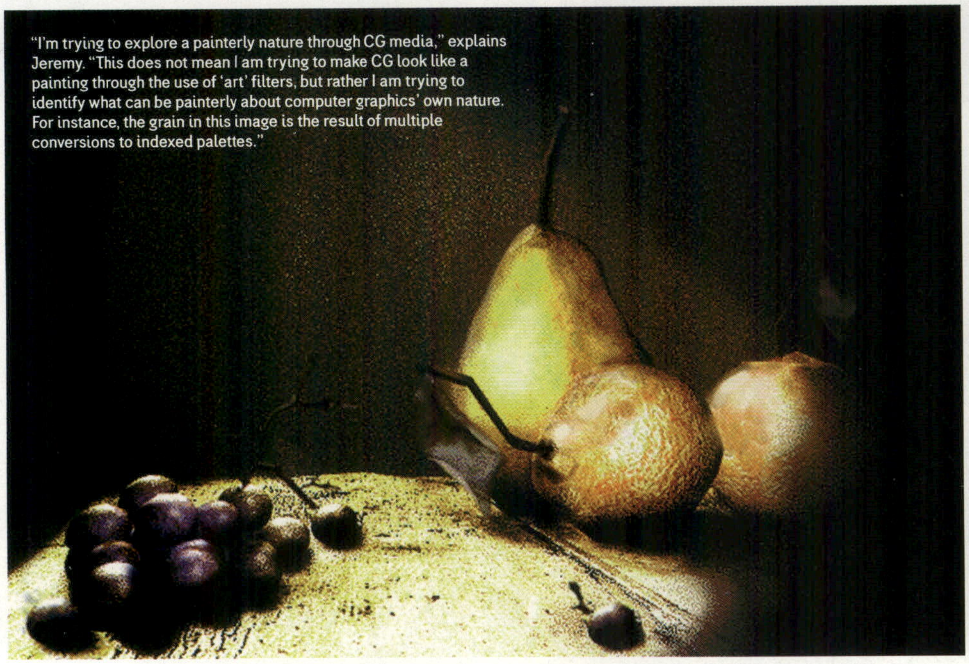
Jeremy is fascinated to see how the 3D world will progress in terms of art. "I would like to see more people explore it – push the limits of the medium, not only photo-realistically, but artistically," he says. "I guess eventually there will be artificial 3D worlds, holodecks, and all that hooey, but I have to admit that I am so taken with the medium itself that I can wait..."

Unsurprisingly, Jeremy draws inspiration from portrait painters, Sargent and Eakins, Chardin's still lifes, Bernini's sculptures, and Leonardo da Vinci. He is intrigued by the blend of sciences and art. "I like to see movement, and a constant searching and learning, and no-one characterises that more than Cezanne."

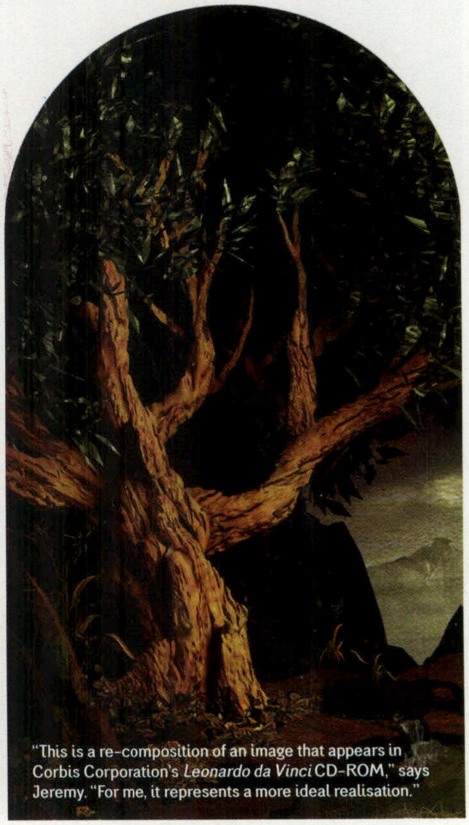
Despite his fine art roots, Jeremy is utterly in love with characters and creating them. His ultimate ambition is to create a cast of characters and a world for them to inhabit. Jeremy isn't giving much away on this point, but he does say: "I have a lot of ideas I would like to get out and convey, and I am trying to think of the best storyline, and medium, to convey them in." Watch this space... ca▸s

You can contact Jeremy A Engleman at **[e]** jeremy@art.net
or visit **[w]** art.net/~jeremy

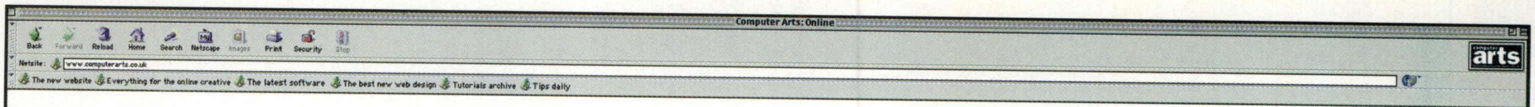
> **"I would like to see more people explore 3D and push the limits of the medium artistically"**



"I'm trying to explore a painterly nature through CG media," explains Jeremy. "This does not mean I am trying to make CG look like a painting through the use of 'art' filters, but rather I am trying to identify what can be painterly about computer graphics' own nature. For instance, the grain in this image is the result of multiple conversions to indexed palettes."



"This is a re-composition of an image that appears in Corbis Corporation's *Leonardo da Vinci* CD-ROM," says Jeremy. "For me, it represents a more ideal realisation."



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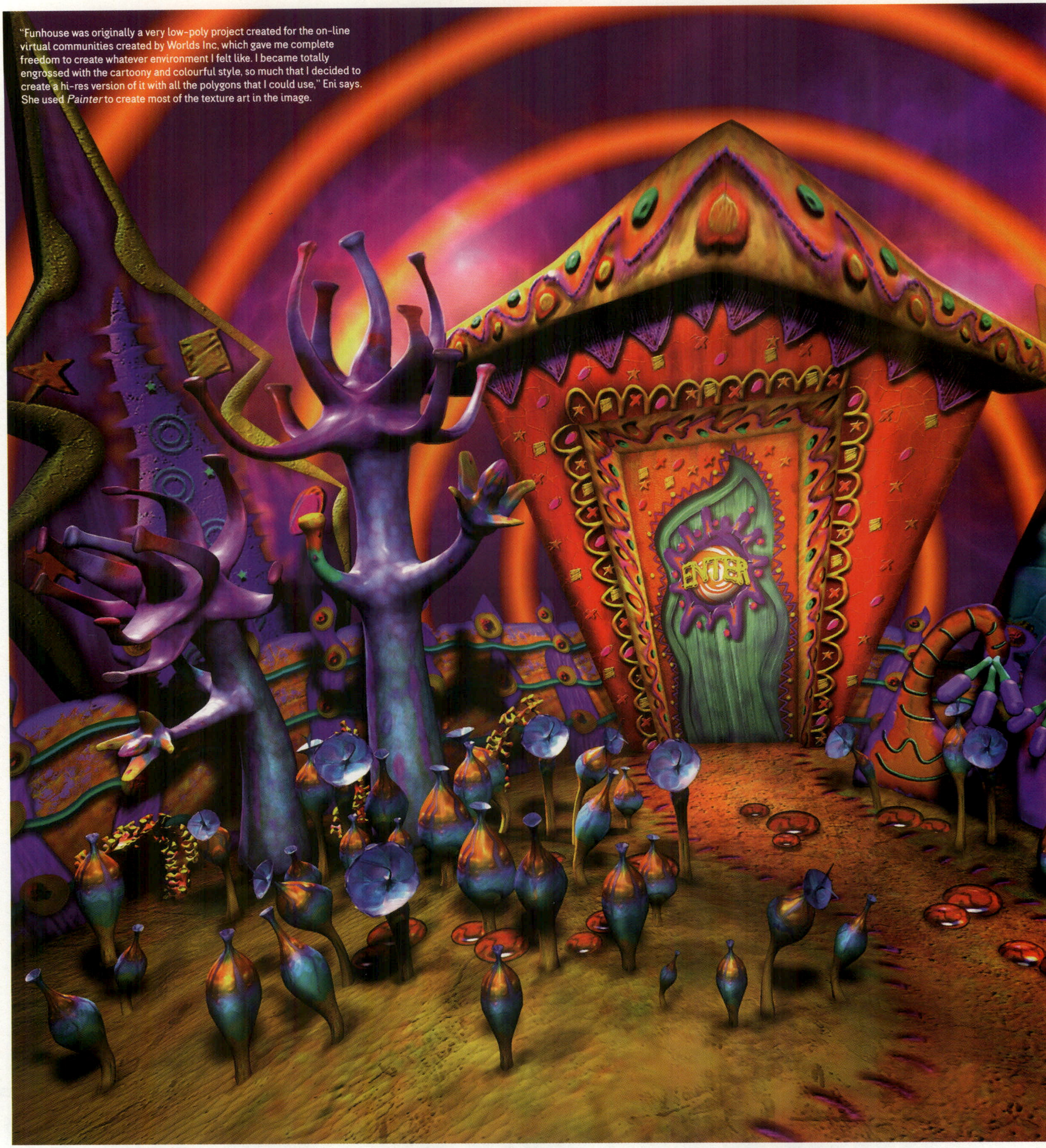


"Funhouse was originally a very low-poly project created for the on-line virtual communities created by Worlds Inc, which gave me complete freedom to create whatever environment I felt like. I became totally engrossed with the cartoony and colourful style, so much that I decided to create a hi-res version of it with all the polygons that I could use," Eni says. She used *Painter* to create most of the texture art in the image.

Eni **Oken**

Journey to breathtaking new destinations with award-winning Brazilian fantasy artist Eni Oken. *"I want to extract the viewer for just a moment to a colourful and rich world..."*

Eni Oken has made a name for herself in the world of 3D by dint of her startlingly original style. She takes the sci-fi genre and gives it a thoroughly organic, colourful and, well, beautiful twist.

"I specialise in creating scenes and illustrations which are realistic, but have a fantasy-ornamental slant to them," says Eni. "I am not interested in recreating reality, even though much of the 3D industry seems heavily attracted to naturalism." Or, to put it another way, laughs Eni, "I got tired of seeing so many shiny, metallic silver spaceships."

It is testament to her talent that within the famously male-dominated world of sci-fi and gaming, Eni has carved an extremely successful career, without compromising her love of decoration.

"Most of my clients come from the interactive world," agrees Eni. "I have requests that vary from ready-made illustrations, to 3D models which can be used for animation." These clients include Activision, Sierra Online, Worlds Inc and Hasbro. Eni was also awarded the 3D Design Big Kahuna award two years running in the Fantasy Worlds category, and has been nominated for this year's award too, for Little Village Far Far Away and Resident Alien.

Whether she is creating a piece like Resident Alien for fun, or an environment for a game like *Zork Nemesis*, Eni's decorative style shines through. She explains her mission: "I happen to believe that, design wise, this last half century is one of the most stark and drab of all times." Yes, despite the iMac.

"People have forgotten how to use ornament, and with that, our work is a little sadder, and our lives a little duller," says Eni, who claims her ambition is to "extract the viewer for just a moment to a colourful and rich world."

Eni strongly believes that being a female artist has a great influence on her particular use of 3D. "Women are naturally inclined to enjoy and produce objects of a more sensual and beautiful nature. Ornament and beautifying is part of the female nature – we grow up with it."

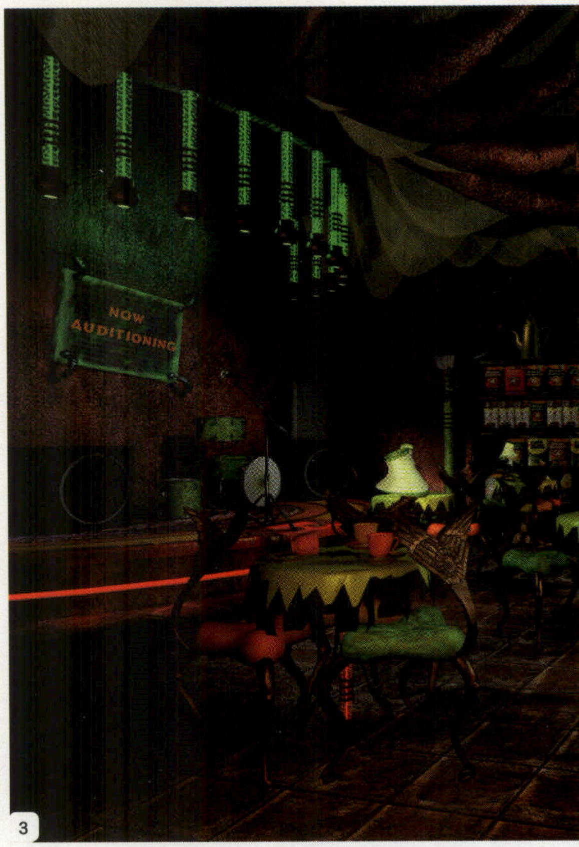
Decoration and beauty are two of the building blocks in Eni's work, and intuition, another 'female' trait, is the third. She says that intuition is extremely important part of any artist's work. "If you plan too much ahead – which is usually the case with computer graphics – you lose some of that natural feeling traditional painters have."

Given these strict principles, it is little wonder that Eni feels strongly about the 3D industry, and art form. "I would like to see 3D art and computer graphics in general recognised as a true art form... I'm working towards that goal." Eni has devoted much time and energy writing articles and giving lectures on the subject. "I want a stronger design and artistic background to the industry – amazingly, few people seem to have it and they seem to concentrate on the technical aspect of it."

So how does Eni create her dazzling, complex images? "Although I used to draw a lot, I don't any more. I feel comfortable enough with the computer as a tool that I don't need to draw beforehand." Once she has been given a brief, Eni seeks out inspiration: "I soak for a few days, looking for reference material. I just look at books, illustrations – anything which can inspire me on the subject at hand. Sometimes I'll look at a beautiful piece of jewellery and ideas just come bubbling into my head."

"I do have a special fascination with ancient history art, jewellery, and with underwater microscopic biology. Also being a woman, and Brazilian, perhaps makes me more aware of organic colourful shapes." Eni elaborates, "Brazil is a colourful country where people of good taste are not afraid of bold colour. Also, I am utterly addicted to ornament – I consider myself an 'ornamentalist'."

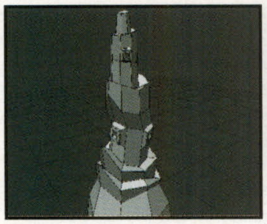
Eni starts the actual image by choosing a colour scheme and some textures. She says: "This is very intuitive, I may or may not use that material in the end at all." After this, she begins by modelling an object from the scene. "Not the most important thing, but something that is nonetheless fundamental. The first object usually takes the longest and the most care to

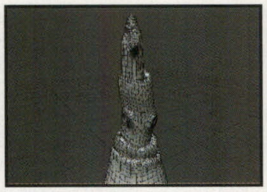

3

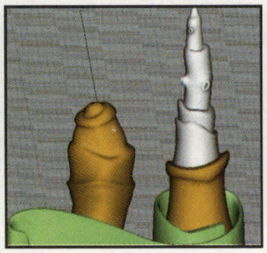
"I would like to see 3D artwork and computer graphics recognised as a true art form"

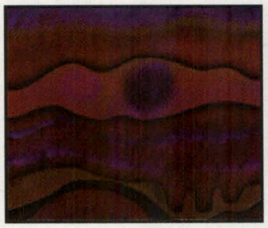
Adding character

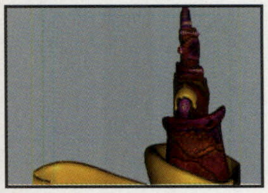
Taking a close-up look at the overall method of modelling, texturing and placement in the scene

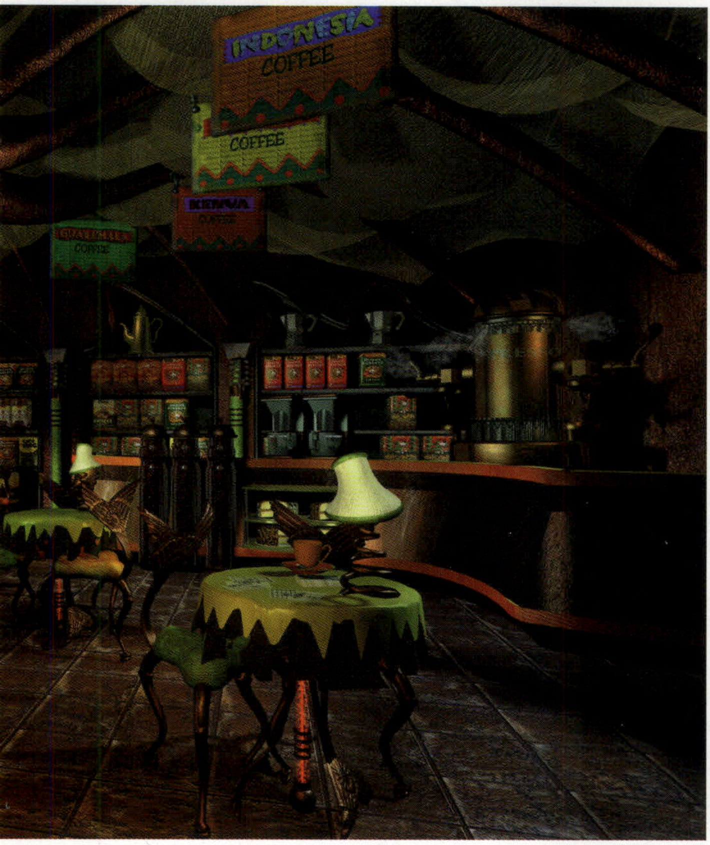

1 Using the 'box modelling' technique, a cylinder was modified to create a rough shape for one of the buildings. It was slightly distorted, so as to not create a totally straight object.

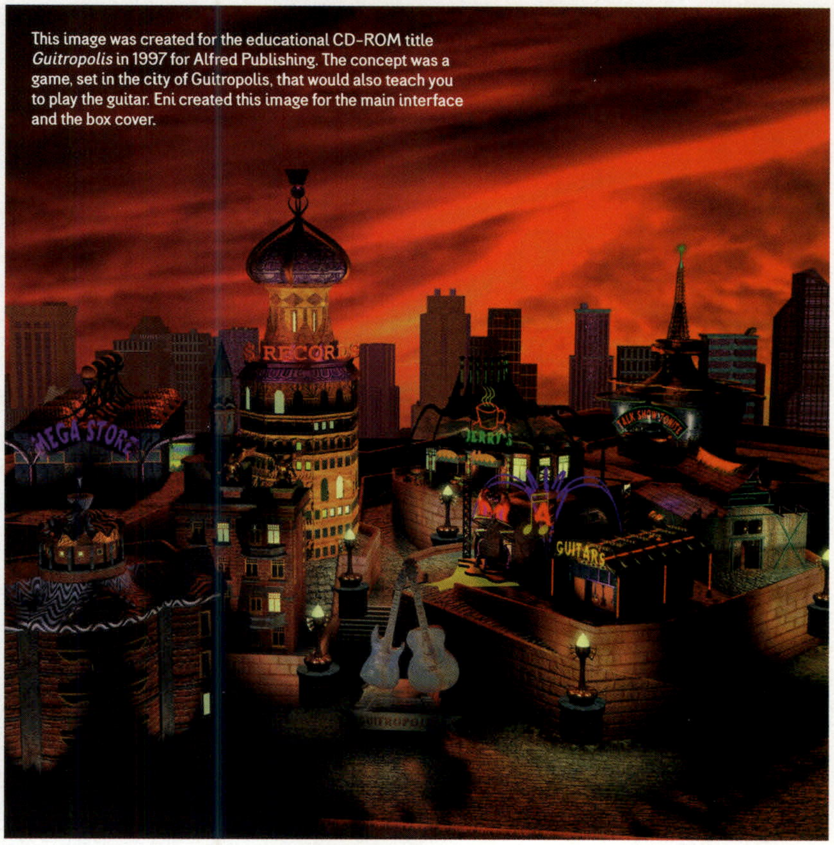

2 The command Smooth was then used inside *Nendo* to smooth out the entire object, converting it into an organic-looking object. This distortion is not as apparent as before, instead, it only adds character, making it look organic and cartoony.


3 The object was then exported to *3D Studio MAX* and placed with other objects that had been previously created using similar techniques.

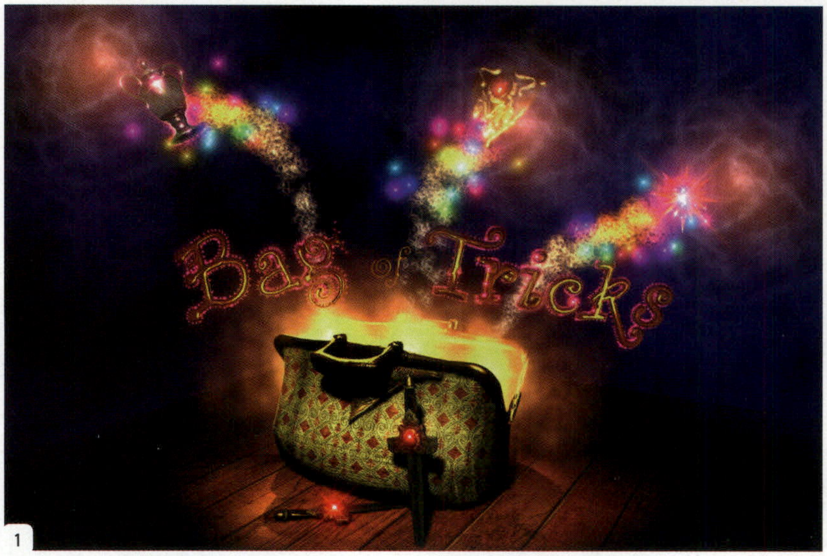

4 Using MetaCreations *Painter* and Adobe *Photoshop*, a customized texture map was created for that specific building. The painterly texture adds to the organic feeling of the overall scene.


5 The texture map was applied to the object using cylindrical mapping coordinates. Smaller details such as a door, awning and decorations were added to complete the building. The base object received similar treatment, integrating the two objects.





This image was created for the educational CD-ROM title *Guitropolis* in 1997 for Alfred Publishing. The concept was a game, set in the city of Guitropolis, that would also teach you to play the guitar. Eni created this image for the main interface and the box cover.



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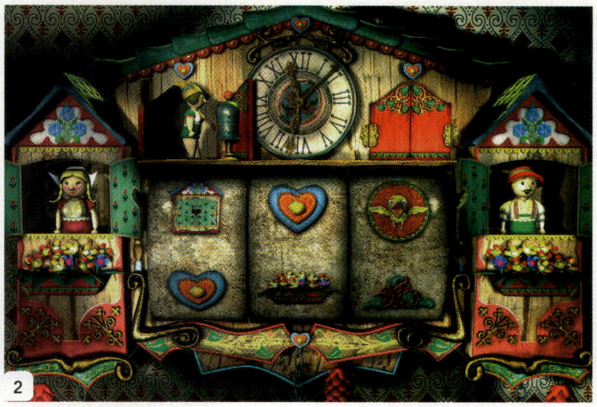


2

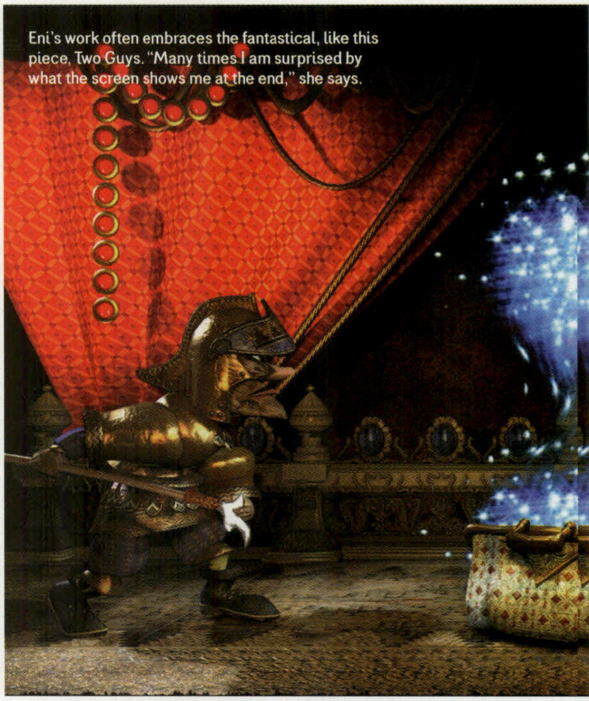
4

1. The Bag of Tricks was created without any commercial project in mind. "I was supposed to test a new flare plug-in for *MAX*, from Cebas," explains Eni. "The theme of an open magical bag where things come flying out had been wandering in my mind for a while. When I started using the plug-in, I became so excited with the potential of making colourful stars and smoke, that I completely went over the top…"

2. "This is from the game *Video Casino*," says Eni. "In this case, the client provided me with an illustration of what they wanted, but left the colours, lighting and texture decoration design totally up to me."

3. These are two of the environments for *Guitropolis*, one is a guitar shop and the other is a coffee shop. As the target audience was young, Eni could let loose and make the environments colourful and fun.

4. These images are taken from *Zork Grand Inquisitor* – the eighth instalment in the *Zork* series of adventure games by Activision.



Eni's work often embraces the fantastical, like this piece, Two Guys. "Many times I am surprised by what the screen shows me at the end," she says.

develop, as it is when I'm not certain of the direction." Eni models it completely including the textures. She continues, "The other objects kind of appear around that first one, following the style".

"I try to make the entire process intuitive, as if it were coming out of my head from a place that I don't even understand. Many times I am surprised by what the screen shows me at the end..."

This combination of technical expertise and intuition comes naturally to Eni. In addition to her 13 years as a freelance 3D computer artist, Eni has spent many years working with traditional media, and is a qualified architect. She explains, "I graduated in architecture in Brazil, where I am originally from. The curriculum is very different in Brazil than it is in the US. It entails learning a variety of artistic subjects such as graphic arts, and object design."

Now living in LA, Eni discovered computers as an artistic tool while working at a small design studio. The company used CAD, which Eni saw as pregnant with possibility. She says, "It was the only thing available – most monitors and video cards at the time in Brazil were still monochromatic. But I had in mind that if I was patient enough, someday the technology would allow me to create the visions I had inside my head."

She now works mainly in *3D Studio MAX*, but uses other packages to fill in for *MAX*'s weak spots. "I like *Nendo* because it's a fast and dirty box modeller with no frills," she says. "*Tru-V* for difficult mapping co-ordinates, *Photoshop* and *Painter* for texture art, and *Animation Master* for very organic elements."

Eni usually sticks with the same techniques throughout her work. She models a basic polygonal structure with few faces and vertices and then smooths it out by applying a modifier. Eni says, "I use this technique because I'm used to it. I have worked with NURBS and patches before, but I still find polygons easier to control." Eni also uses a lot of displacement – placing irregular maps to geometric surfaces. "The map uses the values of darkness to displace the geometry, creating irregular patterns." Eni explains.

Eni's architectural training has been a real boon to creating game environments. She says that whether the game is real-time 3D or pre-rendered, you need to think in terms of 'space'. Eni explains, "If you stop to think about it, the space you are designing is empty, and you are filling it up with obstacles for a user to wander through. It's a completely different experience to looking at a picture."

Perhaps it's this knack of seeing things in a different way that makes Eni's art so enthralling – either way, the future of 3D is colourful... ca▸s

> ***"If I was patient enough, someday the technology would allow me to create the visions in my head"***

You can contact Eni Oken at **[e]** eni@oken3d.com or visit **[w]** www.oken3d.com and **[w]** www.oken3d.com/texkit

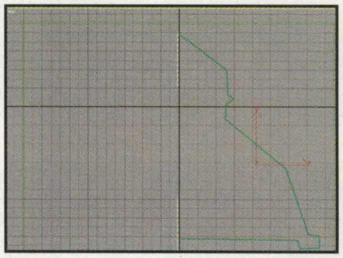
Modelling the Spaceship

How box modelling built A Little Village Far, Far Away...

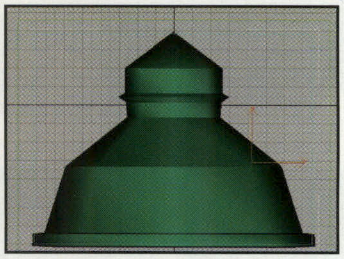
A complex 3D illustration, like the images featured in this profile, is actually not difficult as to create than most people might imagine, especially if you regard it as a collection of many different elements created individually. Each piece is modelled and textured separately. The collection of many elements overlapping one another in a typical background, middleground and foreground configuration is what makes the final image seem so complex, when all the pieces have been put together.

For the image Little Village Far, Far Away most of the elements were modelled with Discreet's *3D Studio MAX* and Nichimen's *Nendo*, and then arranged, textured and lit inside *3D Studio MAX*.

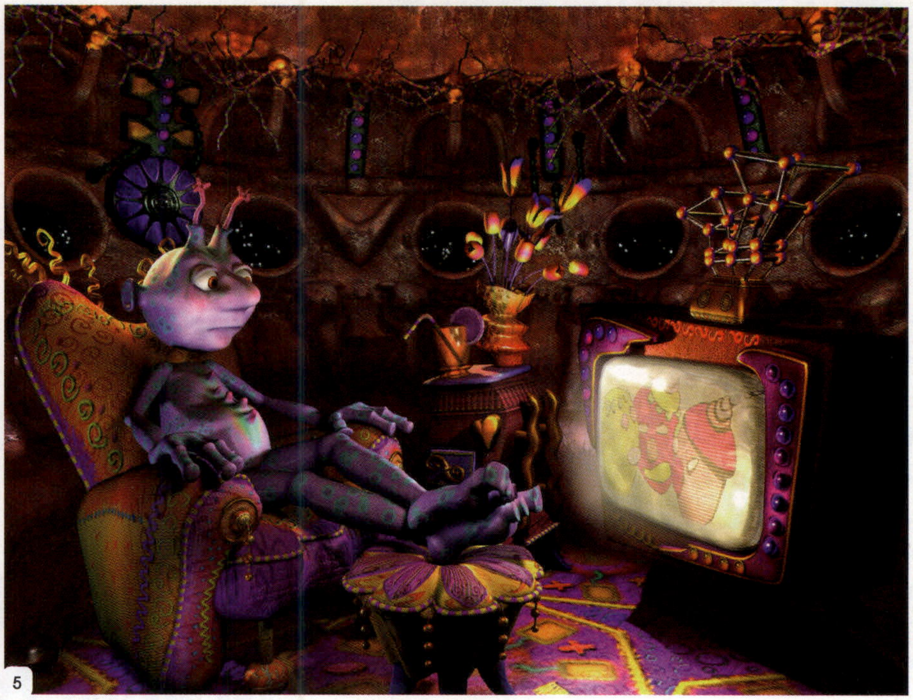
The method chosen to model most objects in this scene was the 'box-modelling' method, which typically starts with a simple polygonal object, modifying and pulling vertices until a rough shape is achieved, and finally, smoothing it all out to obtain an organic final object.

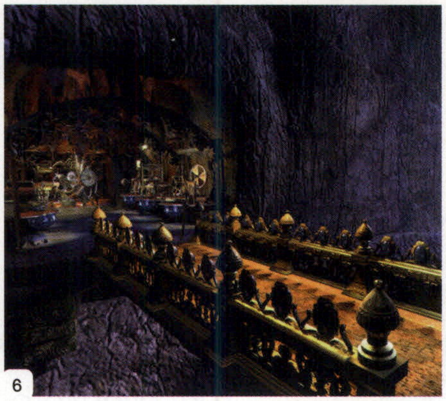


1 Inside *3D Studio MAX*, the Create/Line tool was used to create a very simple profile of the space ship. The objective is to obtain an object with as few polygons as possible.



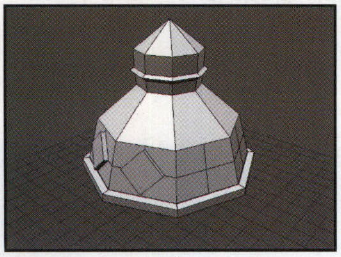
2 The Lathe tool was used to create the basic shape for the spaceship. This object was then exported to *Nendo*, by using the File/Export command, and saving it in 3DS format.



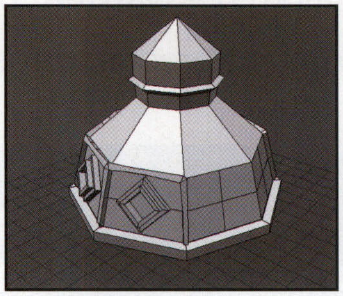


5. "Resident Alien is a term used by American immigration to describe legal residents inside the US. As one of these people, I get teased by my American family all the time. Also, I got tired of seeing so many shiny, metallic silver spaceships, so I tried to show what my version of the interior of an alien ship would be," Eni explains. The image is featured on the cover of the *Inside 3D Studio MAX 3* book.

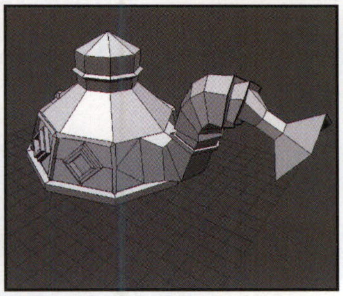
6. This is from the second in the *Zork* series of games. Eni elaborates, "I was given a lot of freedom because the art director was familiar and comfortable with my work." Eni was assigned an entire section of the game to design herself. She comments, "I used a technique called 'layering', where overlapping objects produce a complexity that is far beyond that of the original objects."



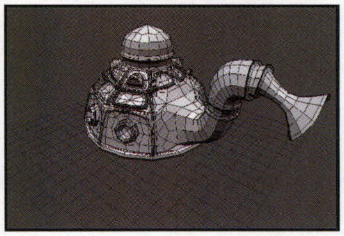
3 Inside *Nendo*, the tools allow for manipulation of vertices, edges and faces. The lower part of the walls had their edges connected to form rough shapes of windows.



4 By extruding and bevelling the diamond-shaped faces of the windows, thick edges were added, to increase detail.



5 The end faces were extruded, scaled and rotated several times, to form a curved-shaped tail pipe for the spaceship.



6 The Smooth command was applied to the entire object, which added an organic feel to it, increasing the polygon count. This model was then exported back to *3D Studio MAX*, where it received textures and lighting.

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webguide

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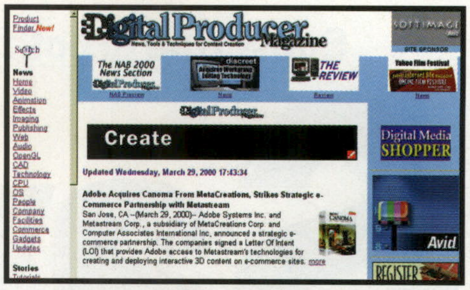

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News, Tools & Techniques for Content Creation

Updated Wednesday, March 29, 2000 17:43:34

Adobe Acquires Canoma From MetaCreations, Strikes Strategic e-Commerce Partnership with Metastream
San Jose, CA --(March 29, 2000)-- Adobe Systems Inc. and Metastream Corp., a subsidiary of MetaCreations Corp. and Computer Associates International Inc, announced a strategic e-commerce partnership. The companies signed a Letter Of Intent (LOI) that provides Adobe access to Metastream's technologies for creating and deploying interactive 3D content on e-commerce sites. more

Digital Producer will point you in the right direction to get your hands on free software and images.

Resources

Black Feet
www.blackfeet.com

Kicking in with a fantastic home page, this site is a veritable treasure trove of design inspiration, as well as offering a range of plug-ins, meshes and so on to buy – but be sure to find the little Union Jack button, or you'll be struggling along in French.

3D Cafe
www.3dcafe.com

One of the Web's favourite 3D truck stops, this is a great place to visit if you're simply in the mood for browsing articles, tutorials, downloadable models and galleries of artists' work. There is, quite seriously, masses of it, and the quality is quite reasonable. A top visit.

3D Links
www.3dlinks.com

Surely this is the ultimate 3D directory. On the *3DS MAX* tutorials page alone there must be links to 100 tutorials on every conceivable aspect of using the package. Here you'll also find discussion forums, information, a variety of software, including Web-oriented 3D and plug-ins for *Photoshop*, textures, galleries and more. If you really don't know what you want, just wade in here and see what you find.

Avalon
http://avalon1.viewpoint.com

With hordes of 3D-related info all wrapped up in an obscurely Celtic ensemble, the latest incarnation of Avalon should part of any 3D devotee's on-line pilgrimage. With FAQs, meshes, textures and incredibly useful info on file formats, there's no shortage of stuff to browse and download. Under Miscellaneous, you'll find links to a bunch of other useful resources too.

> *"The nature of the 3D Artists site is very friendly, and the links section will take you places you haven't been before"*

3D Artists
www.raph.com/3dartists

3D Artists hosts, among other things, a great gallery with some astounding 3D work, as well as an A2Z of artists and interviews, plus a spot where you can post your resume for public perusal. The overall nature of the site is very friendly, which counts for a lot. A well divvied-up links section, with some lesser-known inclusions, promises to take you places you haven't been before. The gallery features 3D artwork submitted by over 140 artists from 30 countries. It's not just a one-way process, as you can tell the world (and the artist) what you think through the feedback form.

Digital Producer
www.digitalproducer.com

Beautiful, no. We're talking masses and masses of everything all about 3D crammed in like sardines with not a shred of tasteful design at Digital Producer. But it's the info that counts, and what's here is more than good enough to compensate if pure factual input is what you're looking for. News is broken down into every conceivable subcategory, from OpenGL to Facilities, and there's tutorials, reviews and lots of links to obtain welcome free software and images. In addition there's a fascinating range of features on how 3D techniques are being used in the latest Hollywood blockbusters. Go see!

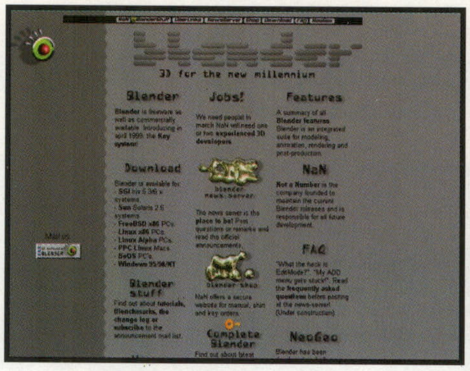
Zone3D
http://zone.3d.com

You need to register to get into the 3D portal, but it's well worth it, with a fine collection of entertainment and infotainment resources, from streaming movies and animations to stories. Stop by.

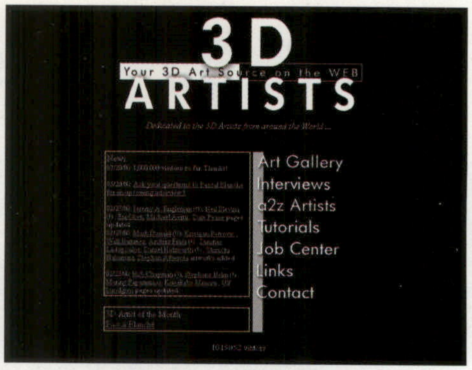
Computer Arts Online
www.computerarts.co.uk

And of course, the best of the lot – the brand spanking new Computer Arts Website is now on-line, complete with 3D tutorials, news, art work and masses more besides. Quite simply, everything for the on-line creative. Take a look right now!

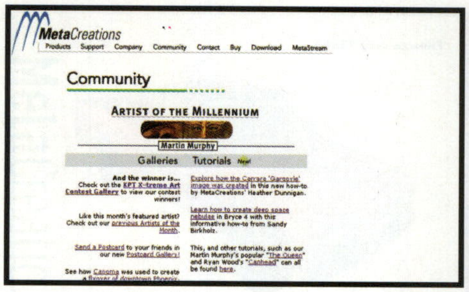
Get your toes moving and head for Blackfeet, with its vast array of 3D plug-ins for *LightWave*, *Softimage* and *3D Studio MAX*.



The *Blender* Website features everything you need to get started with this neat 3D package, including a chatroom.



3D Artists features interviews with many of the artists, plus tutorials for packages such as *Softimage* and *3D Studio MAX*.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ARTIST OF THE MILLENNIUM

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Galleries Tutorials New!

And the winner is... Check out the KPT X-treme Art Contest Gallery to view our contest winners!

Like this month's featured artist? Check out our previous Artists of the Month.

Send a Postcard to your friends in our new Postcard Gallery!

See how Canoma was used to create a flyover of downtown Phoenix.

Explore how the Carrara 'Gargoyle' image was created in this new how-to by MetaCreations' Heather Dunnigan.

Learn how to create deep space nebulae in Bryce 4 with this informative how-to from Sandy Birkholz.

This, and other tutorials, such as our Martin Murphy's popular "The Queen" and Ryan Wood's "Canhead" can all be found here.

The MetaCreations Community is the place to hang out if you're into products like *Carrara*, *Bryce* and *Poser*.

Software

Blender
www.blender.nl

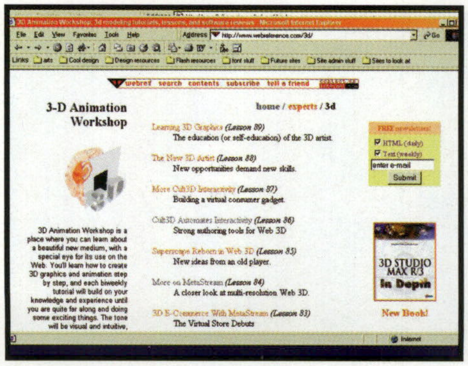
3D for the millennium – that's *Blender*'s boast. Even better, it's free! It's an integrated suite for modelling, animation, rendering and post-production that only takes up 1.5MB. You can get to grips with modelling of polygon meshes, curves, NURBS and metaballs, plus animation with keyframes, motion curves and morphing.

The Poser Forum Online
www.iguanasoft.com/poser

Not entirely functional at the time of writing, The *Poser* Forum Online is in the process of a server-move. But all should be kosher by the time you read this, and the site is well worth a visit if you're as excited about Poser as this lot are. Head straight for the Forum section itself, where you'll find chat and community gossip that's not just about *Poser*, as well as an army of willing respondents to your every *Poser* query.

Flay.Com
www.flay.com

All about *LightWave* – well, almost – Flay's a good spot if you've a hankering for news, inspiration, plug-ins, links and general industry updates relating to the venerable 3D system. It's got something of an in-crowd feel to it, and as if by magic, you can see QuickTimes of some fantastic CG from the likes of Disney, Captain 3D and others.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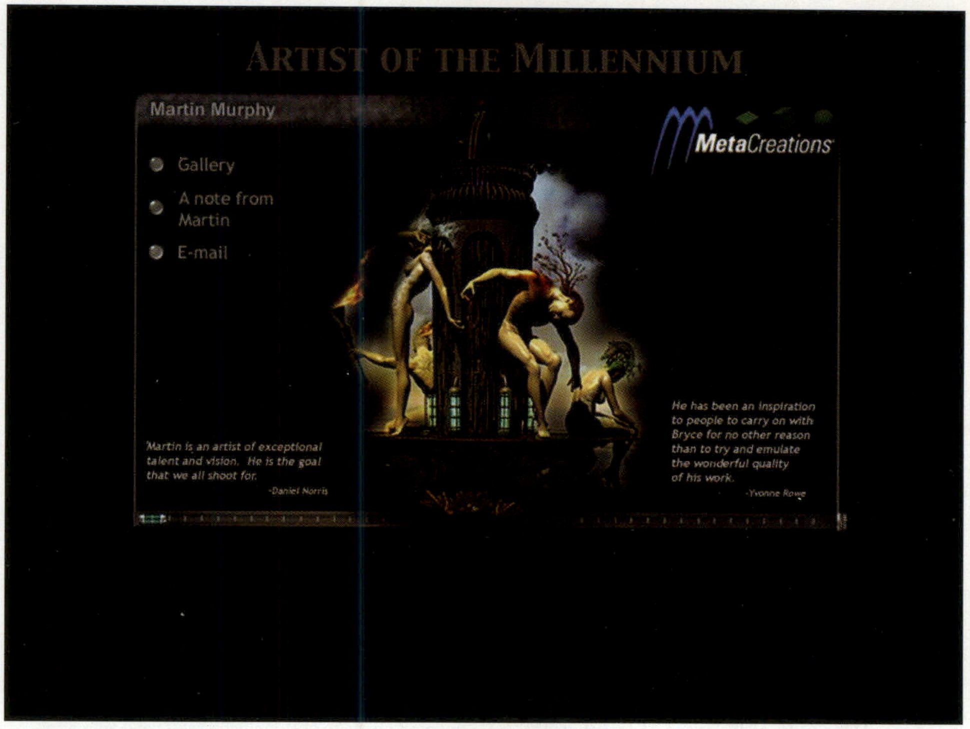
3D STUDIO MAX R/3 In Depth
New Book!

OK, so it's not that much to look at, but the advice featured in the 3D Animation Workshop is as solid as you could hope to find.



'Martin is an artist of exceptional talent and vision. He is the goal that we all shoot for.
-Daniel Norris

He has been an inspiration to people to carry on with Bryce for no other reason than to try and emulate the wonderful quality of his work.
-Yvonne Rowe

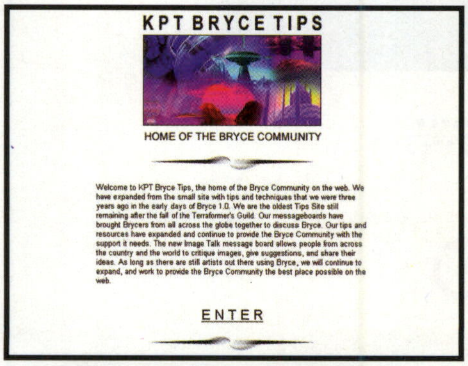
Who is the Artist of the Millennium? Find out at the MetaCreations Community, and start your bid to become the artist of this millennium.

MetaCreations Community
www.metacreations.com/community

For all things Meta, this is, of course, the place to be caught. With galleries, mailing lists and the like for *Carrara*, *Bryce*, *Poser* and other Meta products, there's plenty here to inspire you – and all with an unspeakably clean Meta interface. Be sure to check out the Artist of the Millennium.

KPT Bryce Tips
www.halcyon.com/alrives/brycetips

Dubbed Home of the *Bryce* Community, *Bryce* Tips offers exactly that and much more besides. Four message boards comprise tips, 3D chat, a Q&A zone and a general Image Talk message board, while an alluring link below them offers up an index of tutorials going right back to *Bryce v1*. Good, eh? There's also a *Bryce* masters series for the advanced, and Digital Pinnacle, a gallery of superb renderings.


KPT BRYCE TIPS

HOME OF THE BRYCE COMMUNITY

Welcome to KPT Bryce Tips, the home of the Bryce Community on the web. We have expanded from the small site with tips and techniques that we were three years ago in the early days of Bryce 1.0. We are the oldest Tips Site still remaining after the fall of the Terraformer's Guild. Our messageboards have brought Brycers from all across the globe together to discuss Bryce. Our tips and resources have expanded and continue to provide the Bryce Community with the support it needs. The new Image Talk message board allows people from across the country and the world to critique images, give suggestions, and share their ideas. As long as there are still artists out there using Bryce, we will continue to expand, and work to provide the Bryce Community the best place possible on the web.

ENTER

Bryce to see you, to see you, *Bryce*. This site boasts message boards, tips, FAQs and a mighty archive of tutorials.

3-D Animation Workshop
www.webreference.com/3d

The workshop boasts a fantastic collection of 3D lessons, lately with a powerful bias towards getting the damn stuff on the Web. Don't expect this to be a wildly visual experience – there's barely a picture in sight – but the advice is as solid as the text is dense.

Cinema 4D UK
www.cinema4d.com

Click the UK link here and you'll come to HiSoft, C4D's UK distributor. The site includes updates, tutorials and demo downloads, as well as links to recommended reading, meshes and more. There's less free stuff here than elsewhere, but then you do get what you pay for.

RayDream at Ruku
www.ruku.com/raydream.html

Kicking in with a simple MetaStream splash anim, this paean to the *RayDream* system offers tips and tutorials as well as links to a variety of other sites that excite *RayDream* users. It's easy to follow, teaching about topics like polygon count and extreme-realism in just a few short words with nice big pictures. Very handy.

Vecta3D
www.vecta3d.com

See what you can do combining your 3D with Flash, and deliver to the World Wide Web. Here's the place to check out the superb Vecta3D plug-in for *MAX*.

Animation Master
www.hash.com

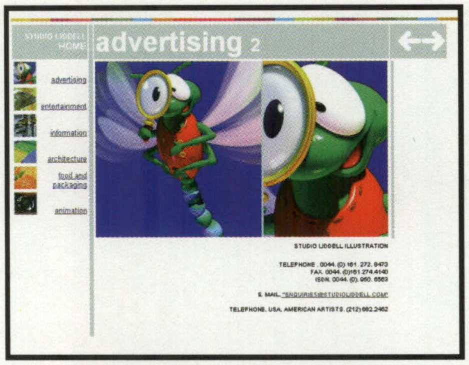
Visit the home of 3D animation package Animation Master for its gallery, if nothing else. There's some top renderings here, including a load of fun and funky streaming QuickTime movies. If you're feeling hot, give the Monthly Art Contest a whizz too.

Pixels 3D UK
www.pixels3d.co.uk

Again, whether or not you use *Pixels 3D*, you really should go here just to see the gallery of artwork done by those that do. Particularly spectacular are some images in the Nature section, combining the best of David Attenborough with the future of alien existence.

Highend 3D
www.maya3d.com

A great resource if you're interested in the big packages – *Maya*, *Softimage*, *Renderman* and the like. There's everything you could need here, from galleries, info about the animation tools available, industry and tech news, a jobs board, and much more.



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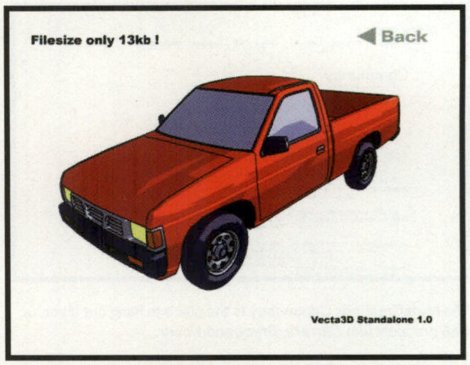
Studio Liddell are the crown princes of innovative 3D graphic design – be inspired by their latest and greatest creations.



Vecta 3D is a joyous plug-in for *3D Studio MAX* which enables you to combine 3D with *Flash* on the Web.

Portfolios & studios

Studio Liddell
www.studioliddell.com

Studio Liddell, the masters of 3D graphic design for ads, packaging and the like, reside here. This site is definitely worth taking a minute to visit, if only to see how great 3D can be, spanning from the ultra-realistic via architectural and informative work to the colourful and comical. Tops.

Unicorn Magic
www.jsspace.com/3dp

Dark and wonderful, here you'll find a regularly updated portfolio of stunning 3D stills and animation, as well as a hotlink into the connected 3D Paradise, mentioned above, and some great links.

Me Company
www.mecompany.com

Me Company are masters of dramatic and charismatic 3D work, and here you can see some of their best. Fantastic Web design and interactivity makes exploring work for the likes of Firetrap (remember those crazy dogs?) a true adventure in art. Truly inspiring.

Audio Motion
www.audiomotion.com

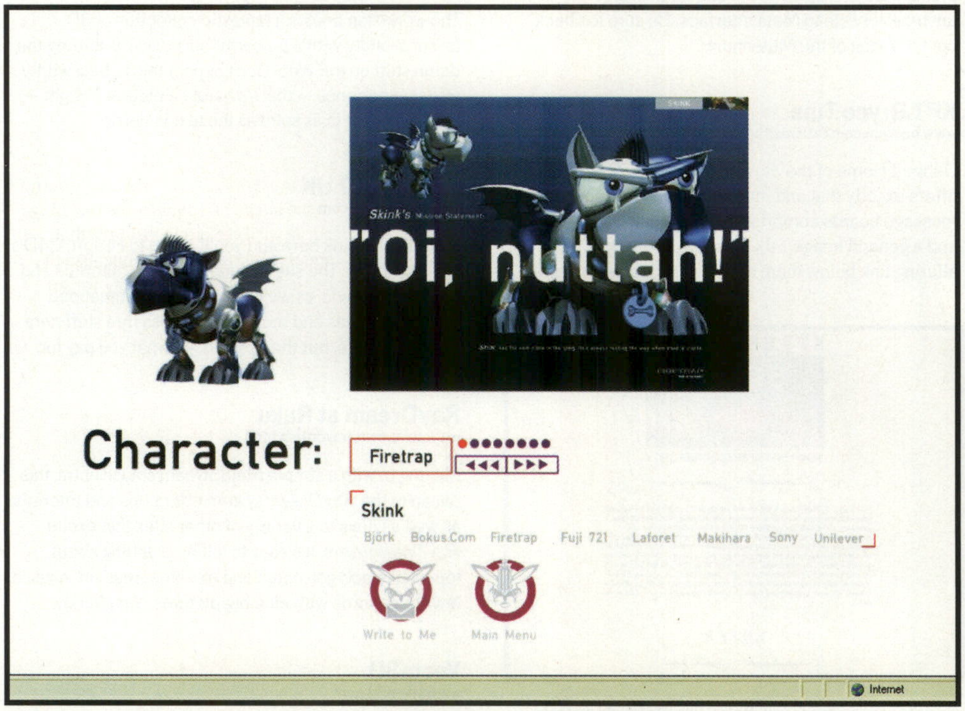
A great Website from the respected 3D, audio and motion-capture outfit, here you'll find not just a great intro, but also a gallery, info about the company's projects, job vacancies and some good links.

Viewpoint Digital
www.viewpoint.com

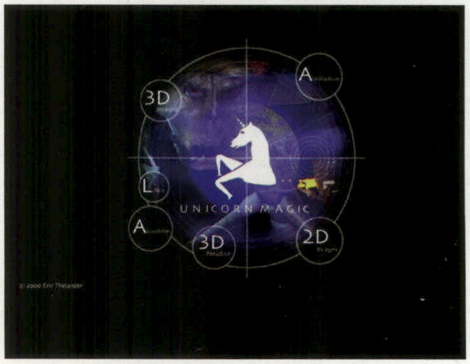
Find out about this superb 3D modelling company here (it supplies most of the commercial models used in games, ads and so forth), with model, texture and plug-in catalogues, as well as general info and updates about the 3D world of Viewpoint. Next time you consider embarking on a massive modelling project, you might be more tempted to buy 'off the shelf'...

Axiomweb
www.axiomweb.co.uk

Home to the 3D architectural visualisation company Axiom, this site gives a great impression of what you can achieve offering clients pre-visualisations of projects for use in presentations and proposals. The quality of work here is quite brilliant. **ca•s**



Discover how the dazzling on-line designs for fashion house Firetrap were created at the Me Company Website.



Enter the dark and mysterious world of Unicorn Magic, with a constantly updated portfolio of stunning 3D animation.

Glossary [3D special]

3D Studio MAX
Often referred to as just *MAX*, this all-encompassing high-end package lives up to its name. It's described by many as the greatest modelling software ever. Used – to the max – by games designers and animators everywhere.

Absolute co-ordinates
Values which express an exact location, size or rotation, whether location co-ordinates, units of measurement or degrees of rotation.

Aliasing
When edges look jagged instead of smooth. Caused by the display not having enough pixels on screen to produce smooth diagonal or curved lines. Solved by anti-aliasing or texture filtering.

Alpha channel
An optional and extra greyscale channel in a texture or image file that usually defines the transparency or opacity.

Amapi
Quirky, unusual and odd are a few words which describe this French 3D application. Brilliant and intuitive are a couple more.

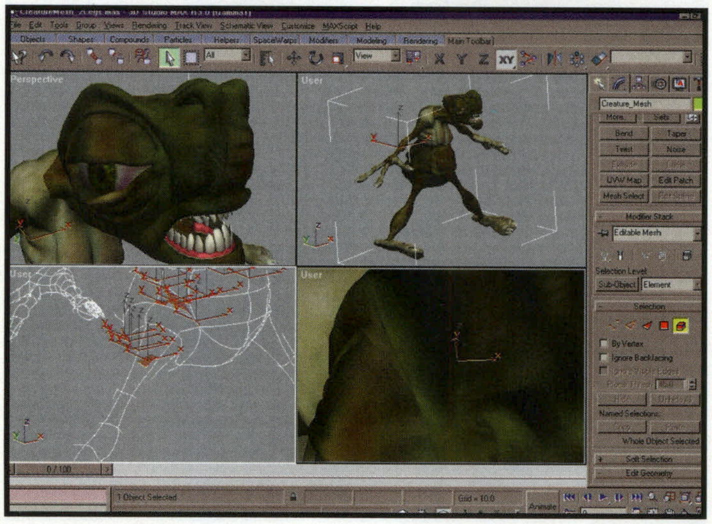
Ambient light
A light source that has no specific direction and should strike every object in your scene with equal intensity.

Anti-aliasing
Put simply, the process that removes the jagged edges. Anti-aliasing makes pixels adjacent to the edges of a line or polygon an intermediate colour – therefore softening the edge and making its appearance less 'jaggy'.

Aspect ratio
A number that describes the shape of an entity. For example, if a bitmap is 100x50 pixels, the aspect ratio is 2:1.

Average blending
In texture blending, average is when the colours of the light map and the base map are blended together. See Base map, Light map, Dark map.

Base map
The main texture used on a polygon. Base maps can be blended together to create a new texture.



One of the giants of the 3D world. Improved interface and tweaked NURBS tools in version 3 continue to make *3D Studio MAX* a winner.

Bitmap
A flat 2D image or texture map.

Boolean operations
Mathematically speaking, the term Boolean describes a system where there are two possible states: on/off, true/false, yes/no, 0/1 etc. When modelling, it refers to the process of combining two or more objects to form a new composite. This new object combines all the mass and dimensions of all the objects involved. This is called Boolean union.

Boolean subtraction, on the other hand, is used to cut out the overlapping volume of two objects, leaving one, minus the overlap. Boolean intersection simply keeps the overlap, getting rid of the rest of both objects' matter.

Bryce
MetaCreations' quirky 3D package. In theory you can model anything in *Bryce*, in practice it's better used purely as a landscape modeller.

Bump mapping
This is a method of texture mapping that fakes surface bumps on a 3D object, without actually changing the object's geometry.

Camera
In 3D computer graphics, the camera is simply the viewpoint through which the scene is viewed. The camera target is where the camera points, and other terms such as Pan, Roll, Tilt and Zoom mean exactly what you'd think. Dolly refers to moving the camera to and from the desired target.

Cartesian space
The modelling space in 3D apps, where every point is described by X, Y and Z. X describes the left-right position, Y the vertical position and Z the depth, or position along the line of sight.

CG
Computer Graphics... that just about says it all.

CGI
Computer Generated Imagery. Refers to any kind of digital image output.

Cinema 4D
Maxon's superb 3D app. Available in three flavours – *GO*, *SE* and *XL*, all represent fantastic value for money.

Clipping panes
Planes that define the borders of Cartesian space.

Curve (spline)
A sequence of straight or curved lines connected to each other by control points (also known as control vertices or CVs). The CVs control the shape of the curve. Curves have no surface, so they are not seen in your final rendered image. Think of them as building blocks for the final surface. Different types of curve include:

•B-spline
A good way to make a smooth curve with extremely few points. B-splines have CVs with equal weights to adjust the shape of the curve. The curve is an average of these CVs and the Control Vertices rarely reside on the line itself, so, for example, if you make four points in the shape of a square, the resulting curve will be a circle inside of that square. This all happens because the curve is pulled inward as it tries to average out the four CVs.

•Bezier curve
Another nice way to create a smooth curve, this time controlled by three or more CVs. The Bezier curve usually only intersects the first and last CV, but is always influenced by the others. Beziers are different from B-splines in that the CVs always touch the curve. Named after its inventor – Pierre Bezier, a designer at Renault.

•Cardinal curves
Smooth curve controlled by three or more CVs. Cardinal curves always pass through every control vertex.

•Linear curves

Made up of short straight line segments that join control points. One to avoid when smooth shapes are required.

•NURBS

(Non-Uniform Rational B-Spines) They sound horribly confusing, but really are quite simple (in practice anyway). NURBS are a special type of B-spline which has weighted control points. The more weight that a CV has, the more the curve is attracted to it and the sharper it bends. NURBS are an important development in 3D over recent years as they enable curved surfaces to be defined by maths function rather than a series of short lines – resulting in more accurate and complex shapes.

Dark map

A texture used, when blended with the base map, to create (surprisingly) a darker texture.

Deformation

A way of transforming a 3D object's geometry to create twists, bulges and more. In other words, a way to 'deform' a primitive into a more complex shape.

Displacement mapping

Similar to bump mapping, except displacement mapping actually affects the geometry of the object.

Dynamic simulation

A way to recreate such phenomena as friction, gravity and wind within your animations. When animating using any kind of dynamic simulation, be sure that you are in control of the collision detection within your 3D app. When animating normally, objects will pass through each other without any problem. However, if you apply collision detection by setting objects as obstacles for other objects, everything should act as it would in real life. For example, to bounce a ball against a wall, the 'wall' object would have to be set up as an obstacle for the 'ball' object. It's not that confusing, honestly.

Frame

Within an animation, a frame is simply one image, or part, of the animation. Animated imagery is often displayed at 25 frames per second – this gives you an idea of the sheer amount of frames involved in a short animation.

Interpolation

The change of state of an object between two specific keyframes.

Inverse kinematics

A process usually used when animating human figures. Briefly, instead of completely animating a figure, you'd just animate the ends – fingers, toes etc, and inverse kinematics will make sure all the intermediate joints move accordingly to the action you are applying. See Skeleton.

Keyframe

The properties of an object or scene, specifically defined in one frame. The object's or scene's position, rotation, size, shape and so on are all specified together in a single frame. You can achieve an animation by altering an object's (or scene's) attributes in consecutive keyframes. The computer then calculates the change over time and the intermediate frames.

Lighting

The generic term for the process of illuminating any scene or object.

Light map

A texture used, when blended with the base map, to create a brighter texture.

LightWave 3D

Another industry standard 3D app.

Maya

Fantastic (and fantastically expensive) 3D app. *Maya* is, simply speaking, one of the best – and the complete version costs nearly £13,000. If you can afford it, buy it. If you buy it, be prepared for many hours of serious learning.

Metaball

Often referred to as 'blobs', metaballs are exactly that. Simply speaking they are balls of computer generated clay. When they overlap, they merge together to form new, more complex shapes. Ideal for modelling smooth, organic forms.

Modeller

The part of a 3D app that enables you to 'model' objects.

Motion capture

The process of 'capturing' or recording live action and transferring it to a 3D app. Most often used to reproduce human movement.

Motion tracking

Motion tracking is the process of matching computer generated animation to live action on a frame by frame basis. Time consuming and tedious, as every single frame has to be tweaked to get perfect results.

Particles

Particles have no volume or surface. Used for creating natural phenomena such as snow, rain and so on. Often particles are rendered separately and composited in the scene.

Patch

More commonly known as a surface, a patch is a mathematically described surface usually generated by two or more curves. If generated from Bezier curves the result will be a Bezier patch, from a B-spline, a B-spline patch and so on. Patches are mainly used to depict smooth, curved surfaces.

Pixels 3D

One of the few Mac-only 3D apps. Always improving, and exceptional value for money.

Polygon

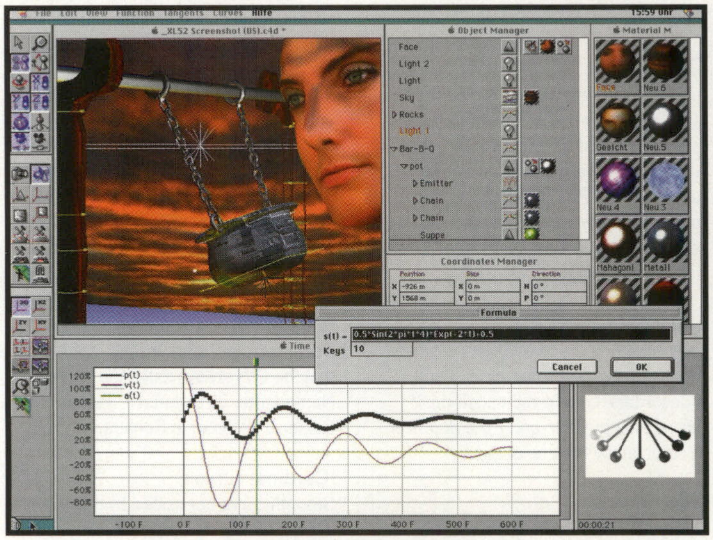
An area that's bordered by three or more straight edges. Basically, a shape that makes up part of your 3D object. Put them together and you can build virtually anything.

Primitives

Basic geometric shapes such as a sphere, cube and torus. Found in any 3D app, these can be edited accordingly to produce the shape you require.

Projection

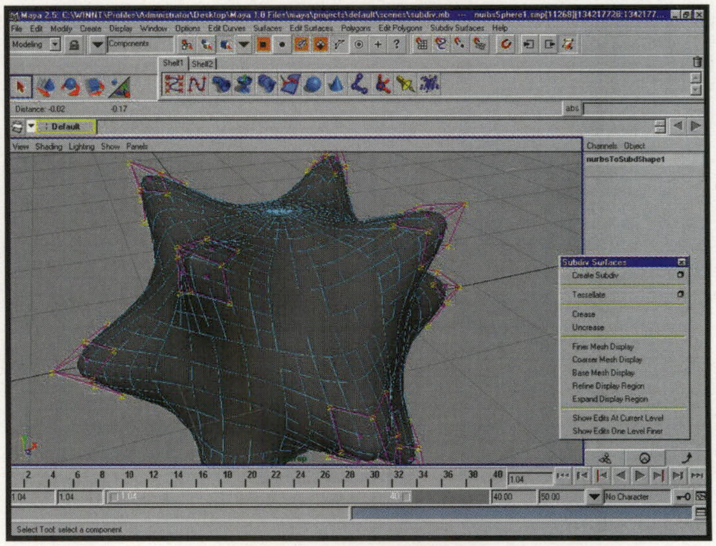
The process of applying a texture to a model. See Texture mapping.



Position X -926 m Y 1568 m
Size X 0 m Y 0 m
Direction H 0° P 0°

Formula
s(t) = 0.5*Sin(2*pi*t*4)*Exp(-2*t)+0.5
Keys 10

Maxon's new and improved *Cinema 4D* comes in three flavours: *GO*, *SE* and *XL*… all represent fantastic value for money.



Maya is a high-end, high-price package that's certainly not for beginners. Fantastic results go hand in hand with the incredibly steep learning curve.

Raytracing

Raytracing is where things get tricky. A type of rendering method, raytracing synthesises images by projecting a virtual beam of light into a 3D scene in order to assess shading and visibility. The virtual beam of light may be absorbed or reflected by every object it strikes. Raytracing works best when rendering shiny or metallic objects.

Reflection mapping

A method of texture mapping that achieves reflected surfaces without the need for raytracing. Also saves render time.

Refraction mapping

Similar to reflection mapping, except used for transparent objects.

Render or rendering

Rendering is the process of transforming your 3D scene into a bitmapped image or animation.

Secondary rays

Secondary rays are the result of a primary ray (light source) hitting a reflective object. A secondary ray is created and is bounced around the scene until it becomes the final colour of a pixel.

Scene

The viewable area that contains all the objects, lighting effects and cameras created when modelling in any 3D app.

Shader

Just as the name suggests, the shader calculates, assigns values to, and controls the way the surface interacts with light in a scene. This creates the object's colour, transparency, reflection and surrounding light. The purpose of the shader is to mimic the properties of the material that the object is supposed to be made of – glass, wood etc. Different types of shaders include:

•Phong
Phong shading calculates every pixel on the texture separately, processing the relationship between the surface, light source and the camera's point of view. Therefore, a much better curvature is produced.

•Blinn
Used when an extremely shiny or metallic surface is needed. Similar to Phong shading in its technicalities.

•Uniform (or constant)
The simplest shader. Simply affects the surface colour – which is constant across the entire surface.

•Lambert
Produces a smoothly shaded object by interpolating between surfaces of two adjacent polygons. Produces matte, unpolished surfaces.

•Gouraud
Simplified version of the Lambert shader.

Skeleton

Figures are more easily animated by building a skeleton, animating it, and then adding the skin texture and so on.

Softimage

Yet another fantastic high-end 3D application. By the way, it's pronounced 'Softimahge', for those who are interested.

Specular

Known in the real world as highlights, specularity is the reflection of any light source off an object back into the viewer's eye. Important as it implies curvature in 3D space.

Spotlight

As the name suggests, a spotlight projects a concentrated, cone-shaped light to a specific object or destination within a scene.

Surface

The surface of a 3D object. See Patch.

Tessellate

The process of dividing an object or a surface into polygons in order to simplify rendering.

Texel

After mapping a texture to a model, the pixels within the 2D texture are then transformed into texels. When the model is rendered, the texels are then transformed into screen pixels. So the process goes: pixels, texels, screen pixels. Got that?

Texture

Either a 2D (bitmap) image or a 3D (or procedural) texture. A 3D texture consists of patterns generated by mathematical algorithms.

Texture filtering

The generic term used whenever a texture is altered. It could be to remove jagged edges (anti-aliasing) or to blend two textures together.

Texture mapping

The process of wrapping a bitmap or image file around a 3D surface. Used to add realism to your 3D models. Textures can be wrapped in different ways. The process of actually applying the texture to your object is called Projection. The four common types of projection are as follows:

•Planar – for flat objects.
•Cylindrical – for cylindrical objects surprisingly.
•Spherical – for spheroids.
•Box – for cuboid objects.

Tiling

As the name suggests, tiling is the process of repeating a texture more than once across a polygon. Works best when tiled textures line up seamlessly. A good way of using a small texture to create a big effect.

Vertex or Vertices

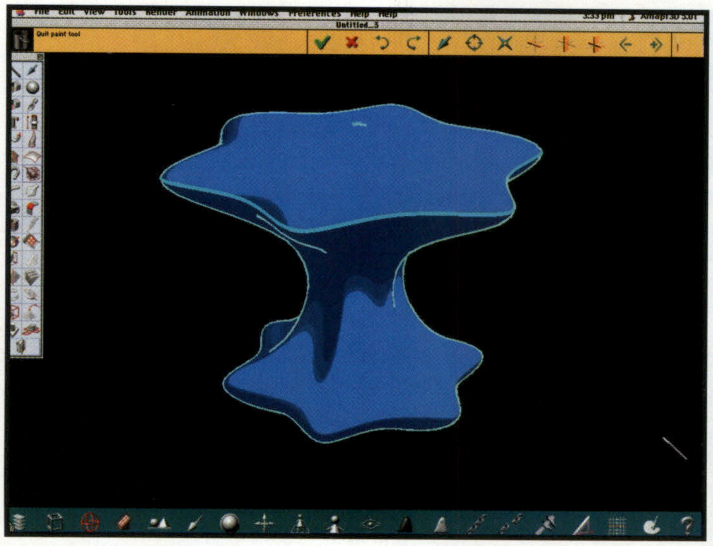
A point in 3D space described by the X,Y and Z co-ordinates.

Wireframe

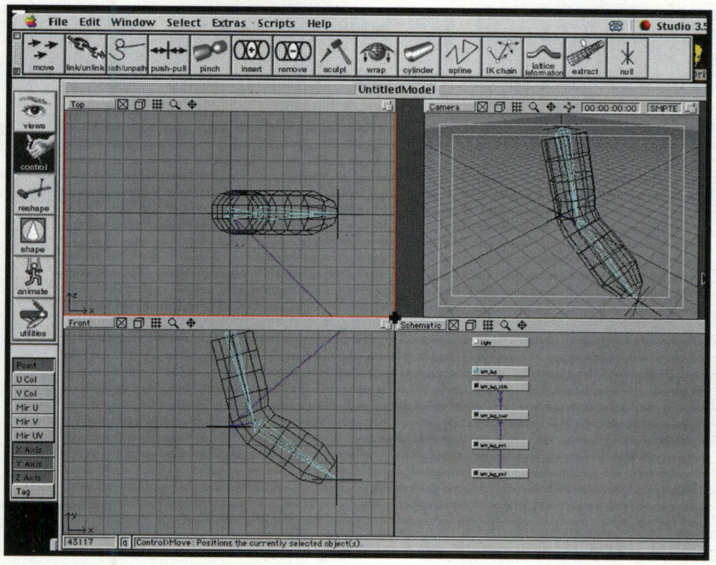
A wireframe is a simplistic, mesh-like representation of a 3D object.

Z-Buffering

The process of sorting a scene to display objects in the right Z order.



Some say *Amapi* is quirky and difficult to use, others say it's intuitive and a dream to work with… you're just going to have to make your mind up.



Mac-only 3D modeller that's always improving. That'll be *Pixels 3D* then.

Back issues [09/05.00]

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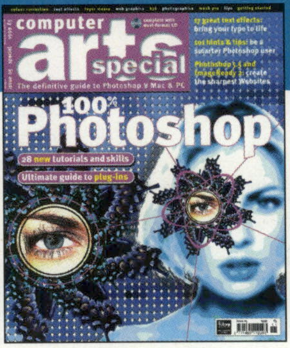
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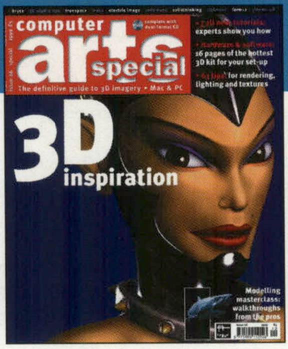

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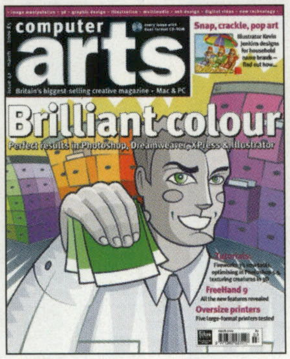

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Colour management, *Fireworks 3* and *Photoshop* tutorials.
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Issue 43 – Code CA043
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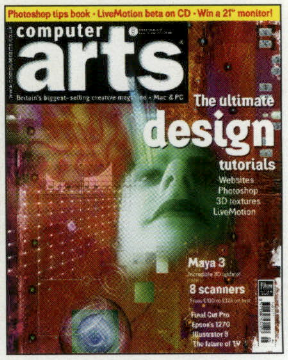

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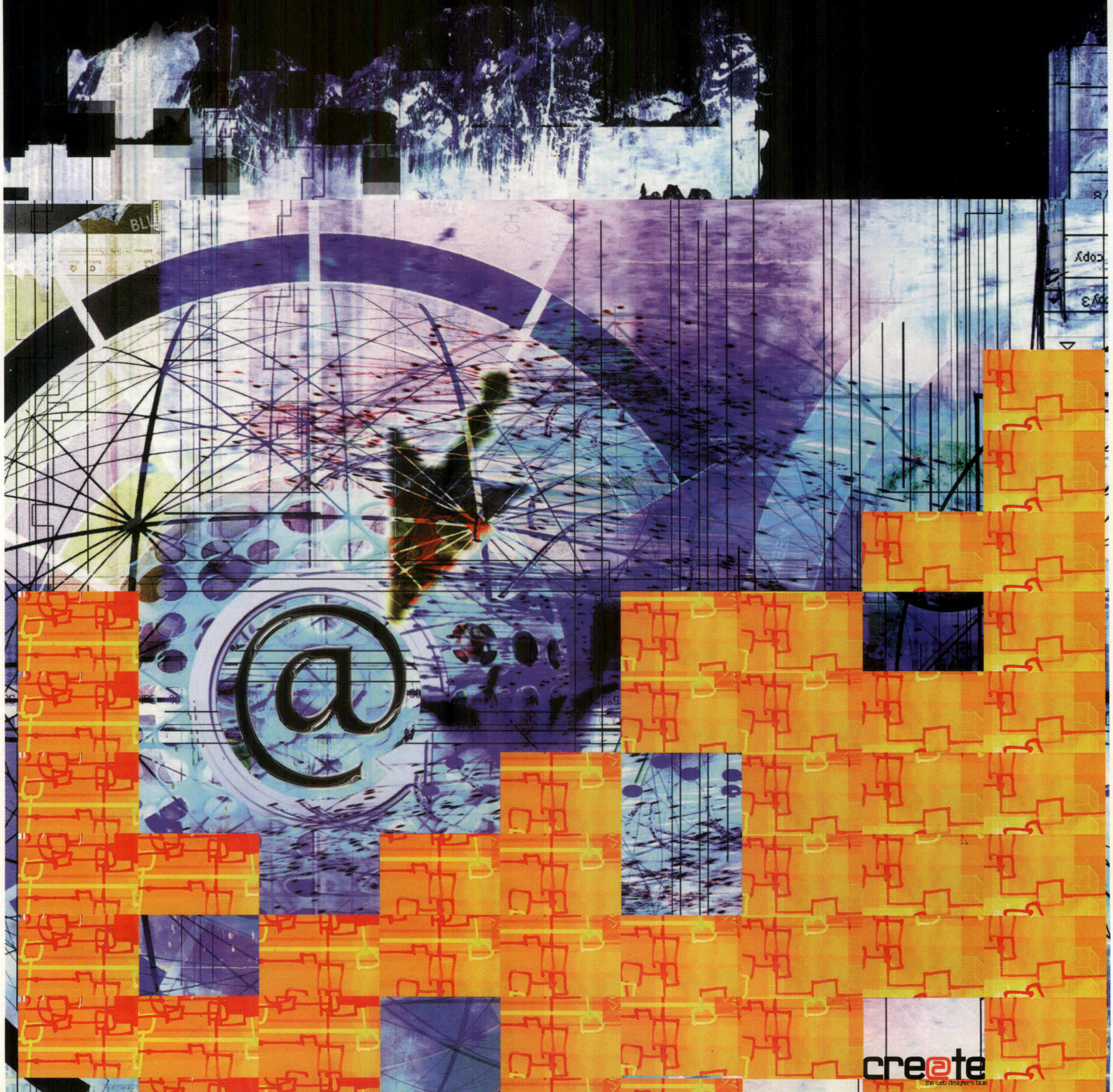

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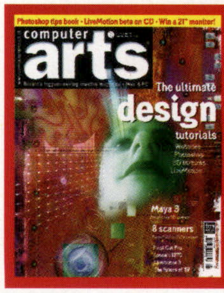

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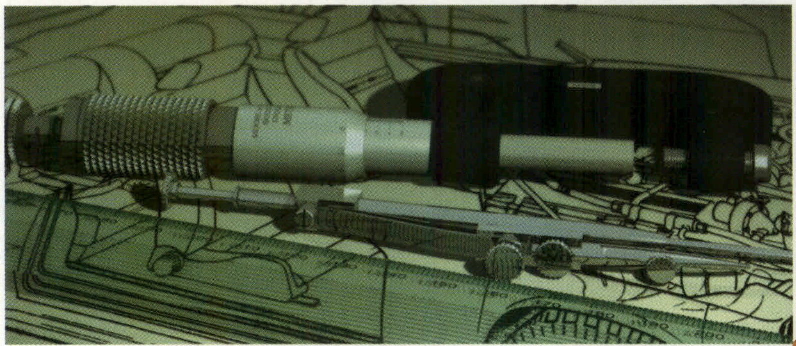

1 Matthew **Harwood**

[e] matt@pie.ndo.co.uk

Output Three, Sharp and Robot

Mat is a freelance product illustrator, but all the images here were created in his spare time. "Sharp and Output Three were images I had in portfolio two years ago," begins Mat, "and Robot was an exercise in *Raydream*'s inverse kinematics." The car in Output Three is a scanned ink illustration which Mat drew in 1989. "This was to demonstrate the quality of the *Raydream* tracer." Evo was created in *Photoshop*, by layering *KPT* gradients with Difference and Multiply calculations then flattening it. "Sharp was created using *Illustrator*," says Mat. It started with a distorted plane view, from which he created and further manipulated a 3D line illustration. Mat works on a G3 with 192MB RAM running *Illustrator 7.0*, *Photoshop 4.0*, *Raydream 5.0* and *Bryce 2.0*.

2 Jose I **Garcia**

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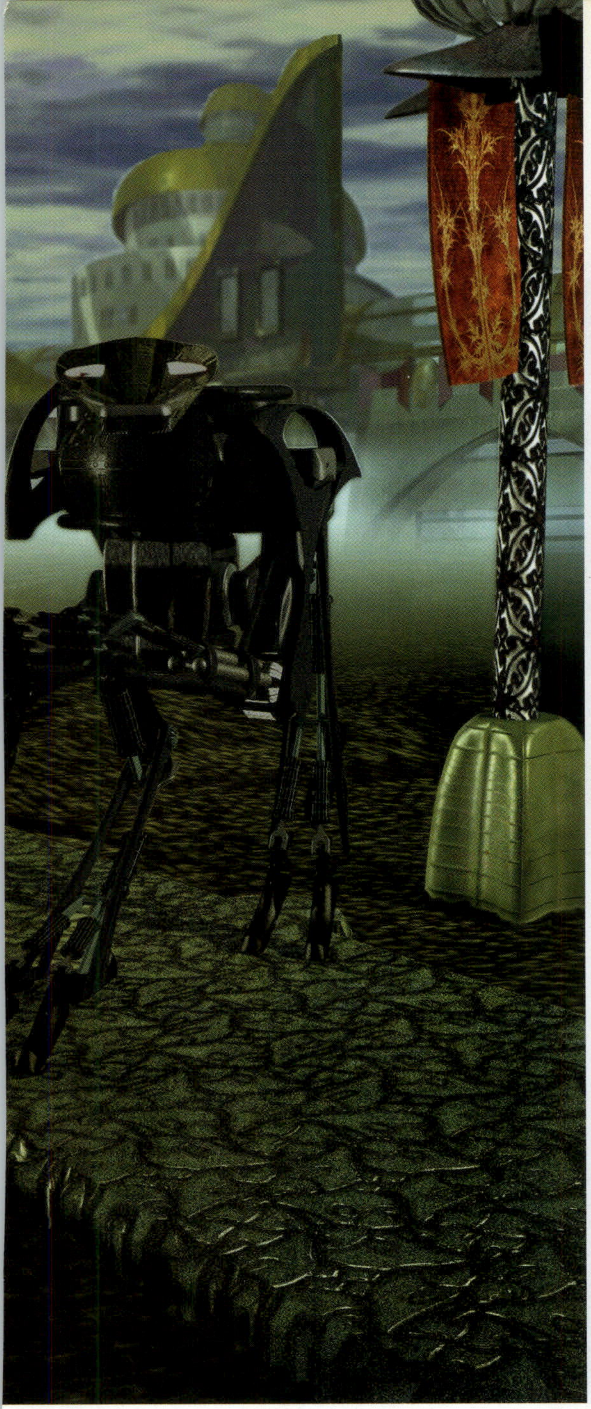
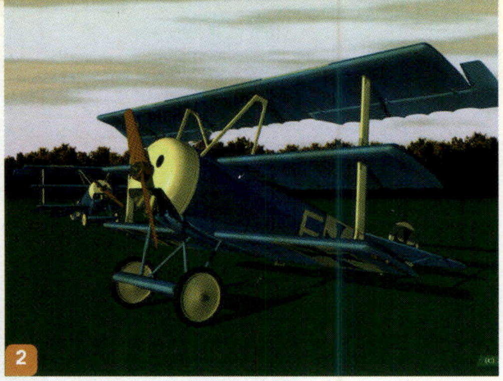
Fokker

"I create most of my images during my spare time," says Jose, who is soon to finish a course at the Academy of Digital Art in Madrid. "Fokker was the first image I created," he explains. "It was, for the most part, composed in *LightWave*, but I also used *Photoshop* for the trees, background and sky." The wings and tail were modelled using the spline tool, and for the engine he used the Boolean tool. Jose likes to spend time developing lighting effects than developing the model itself. "I think the lighting can have more effect on how real an image looks," he explains. Much of the inspiration for Jose's models comes from science fiction movies.





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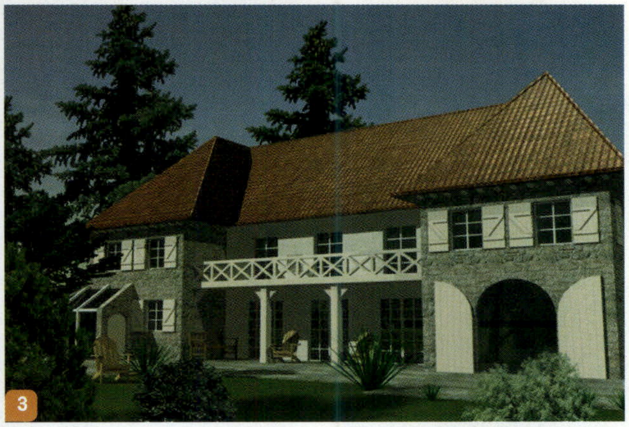

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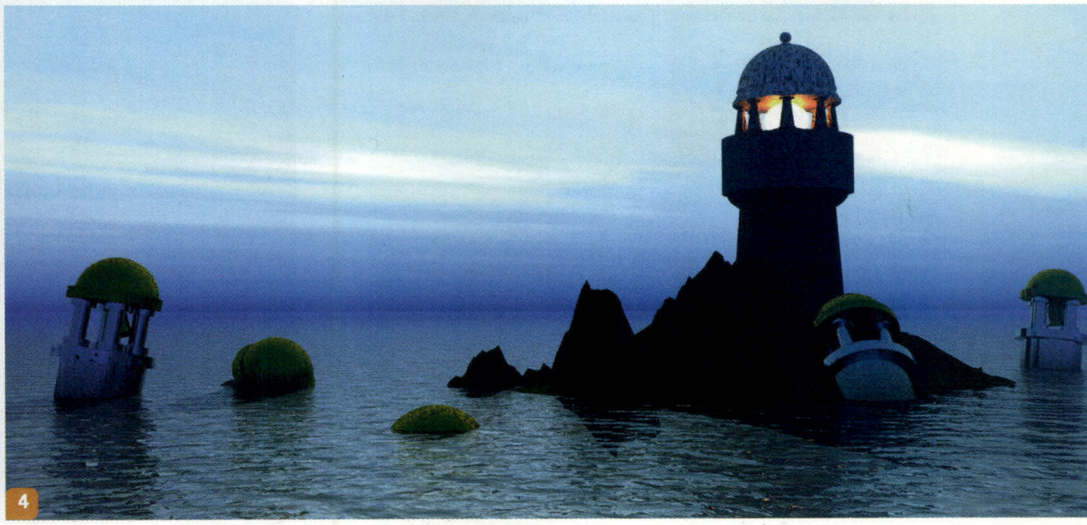

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3 Aivaras **Grauzinis**

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Architectural Visualisation

Aivaras works as a freelance designer, doing everything from visualization to animation and Web design. This image was modelled in *Rhino*, using mainly the Boolean and extruding tools, and then it was manipulated further using *LightWave*. "I think *LightWave* renders unbeatable photo-realistic images," says Aivaras. All textures, except for the photograph-based cobblestone walls, are regular *LightWave* textures. Aivaras created this to help a friend who was struggling to find ways to extend his house. "It's very rewarding," he says, "to see the amazement when you show people what their house could look like." Aivaras is currently trying to develop realistic fluid simulation and realistic digital fur and hair, "I think these things are still very weak in digital arts."

4 Hamish **Marr**

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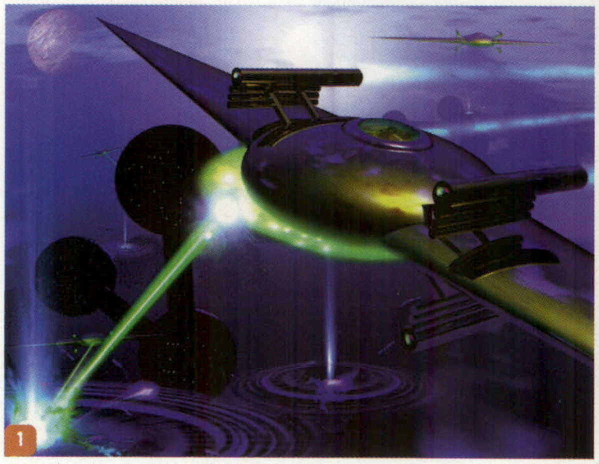
Tropic Of Torre Alba

Hamish is a graduate and teacher of sculpture. And as a sculptor, he finds that digital work frees him from the concerns of material and scale. "The digital practice is similar to traditional techniques. There are practical parallels in modelling, constructing, carving, moulding and casting." Most recently, Hamish's work has been selected to appear in an exhibition of contemporary digital art, called Digital Expressions. This image was created entirely in *Vue d'Esprit 3* on a Dell XPS T500 with 256MB RAM. "Tropic Of Torre Alba," Hamish says, "is one of a series of imaginary lighthouses that will feature in the exhibition. And, like most of his work, is inspired by his upbringing in the Orkney Islands. "The lighthouse here is a focal point but it stands alone."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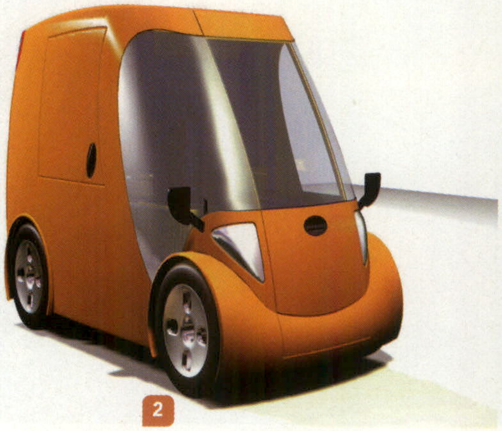
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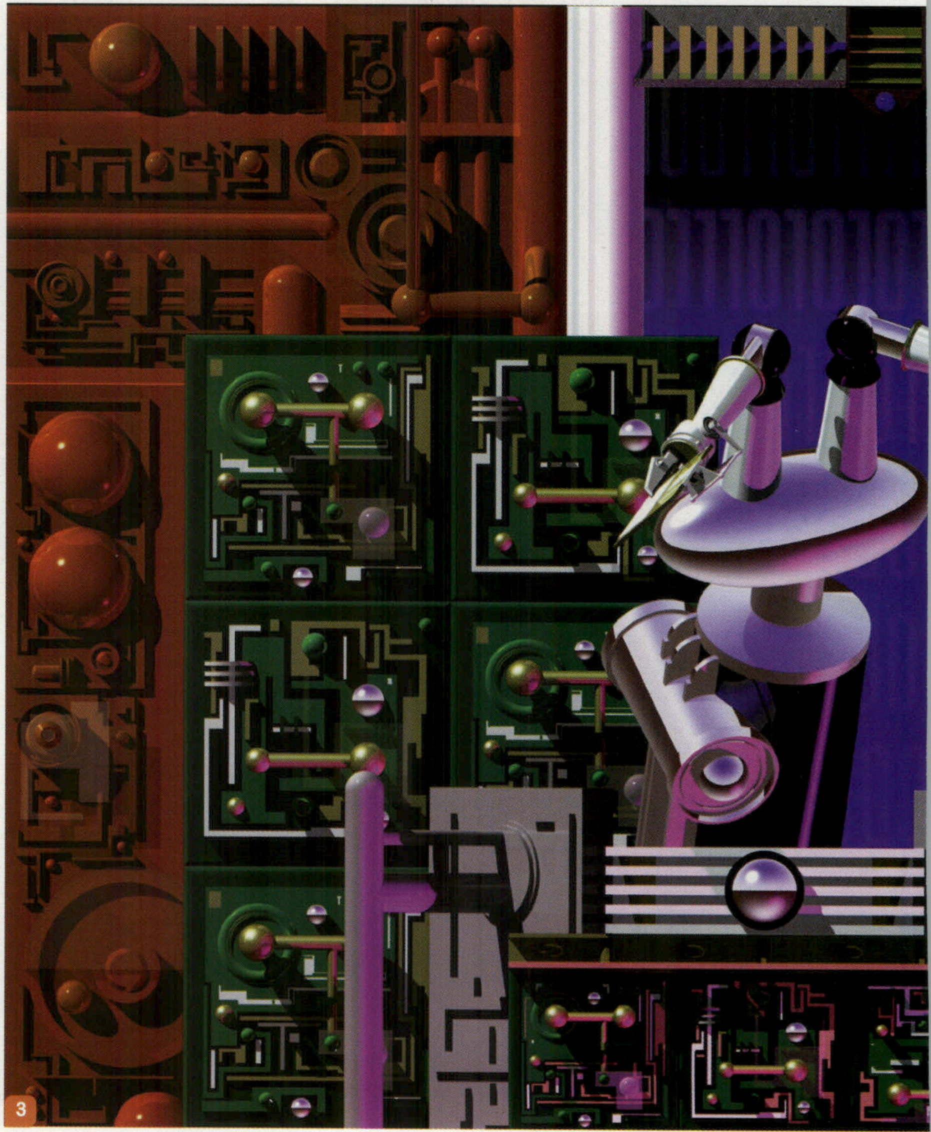
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1 Jason **Wettstein**

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Invasion

This image grew from an image Jason held in his mind. It was created using *Bryce* and many of its edit tools. Jason explains, "I applied textures and lighting effects until I felt it was ready." He then constructed the space city (also in *Bryce*) before exporting all files into *Photoshop 5* where he layered the main ship over the background and touched up a few details using *KPT*, *Flux* and *Eye Candy* plug-ins. The explosions were created by "feathering a circle," he says, "and then adding radial blur, colour, scale and perspective". He then ported the image back into *Bryce* to reposition it and finish the design. Jason works as a graphic artist and Web designer, and wants to dedicate Invasion to his grandparents, who "don't see what I do as being 'proper' work".

2 Henrik **Andersen**

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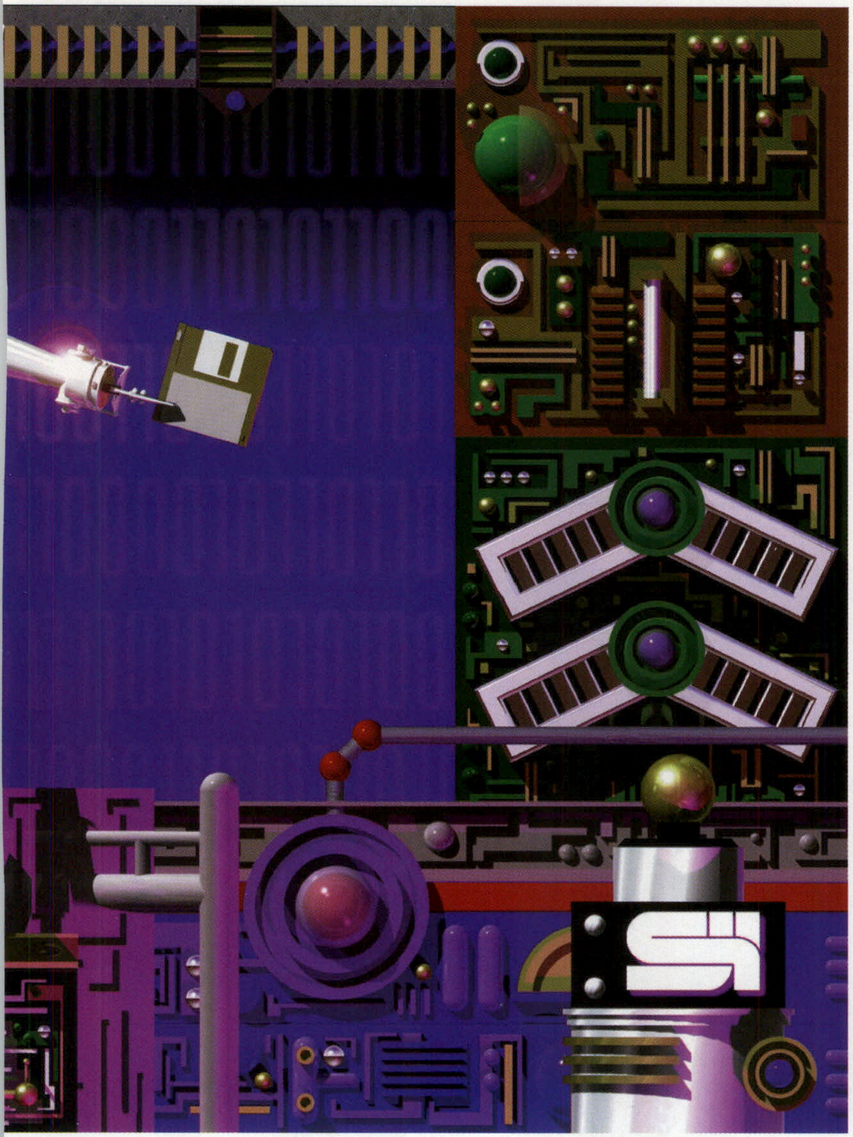
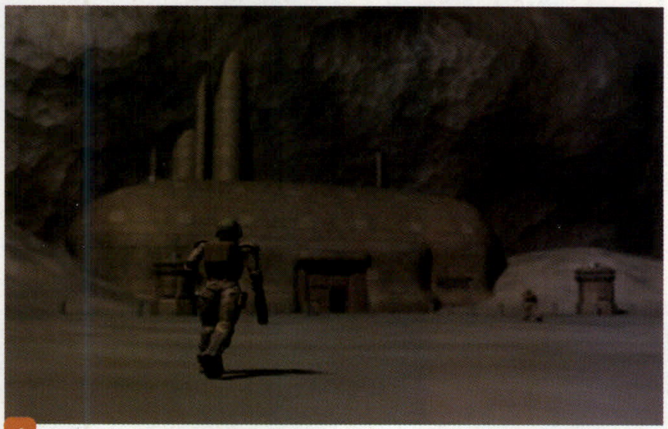
Mail Car 1

This image was modelled using *Rhino*. It was a design brief set by his college that inspired the image. "It's a proposition for a mail delivery car for the Danish postal service," says Henrik. The shape of the basic image was established in *Rhino* where he used Boolean, sweep and patch modelling to create the effects on the wheels, the body and the lights respectively. Once the basic shape was achieved, Henrik exported the *3DS*-formatted image into *3D Studio Viz* where he applied all the materials, textures and lighting effects. "The final image was rendered in *Viz* too," explains Henrik. "I then ported it into *Photoshop* to finish it up a little..." Henrik graduates from his course in a year, and hopes to get a job in an industrial design firm until he feels ready to start his own business.





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3 Steve **Hines**

[e] studio3d@arn.net

Robotics 1

Steve runs a company called Design Domain Studio, from his home studio in Texas, using mainly a PowerMac 9600/300. "I work on a wide variety of projects," he explains, "from presentation folders to Web graphics." All of Steve's 3D illustrations grow from separate shapes he draws in Adobe *Illustrator*. After he's drawn the shapes, he extrudes or lathes them in *Strata Vision 3D 5.0*, then takes them into *Photoshop*. "Many of the textures and colours are taken directly from *Strata*," says Steve. "But if I have a specific texture in mind, I will create it myself in *Photoshop*." He then prints a black and white copy of each layer, and arranges it on to a poster board. "When I'm happy with the shapes on the board, I try to create a similar effect with my layers in *Photoshop*."

4 Campbell-John **Dick**

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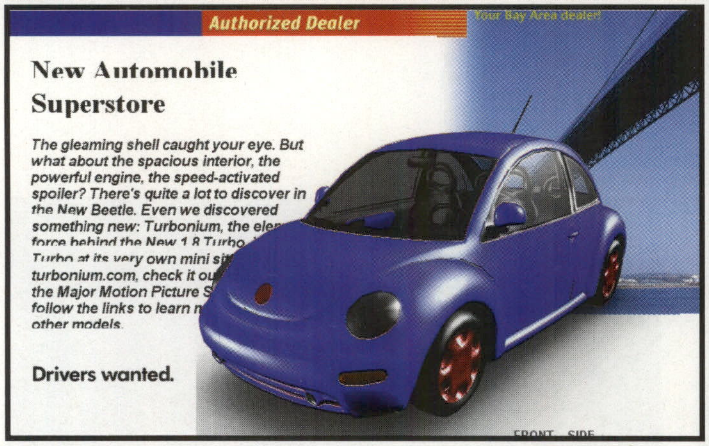
Almost Home and Old Bed

Both these images were modelled in *LightWave* on a Pentium III 450 with 128MB RAM. "I use *Photoshop* for the majority of my textures," says CJ, "but I try to stop there. I don't like to manipulate my final image in *Photoshop* – I try to create all the effects using only the 3D packages." CJ has used Bump maps and displacement maps to create the background in Almost Home, and scanned his favourite posters of *Superman* and *Star Wars* for Old Bedroom. Along with *LightWave* and *Photoshop*, CJ often uses *Bryce*, *Poser*, *Extreme 3D* and has recently acquired *3D Studio MAX*. Although he is delighted to have just started work for a videogames company in Scotland, CJ is tempted by the thought of setting up his own business as a graphic designer. ca>s

Metastream



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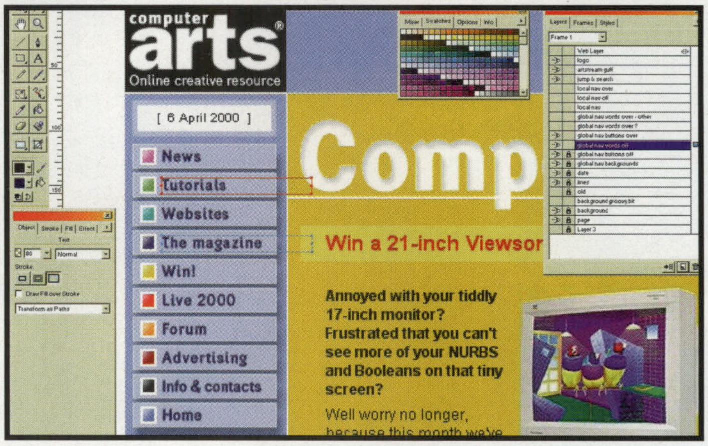

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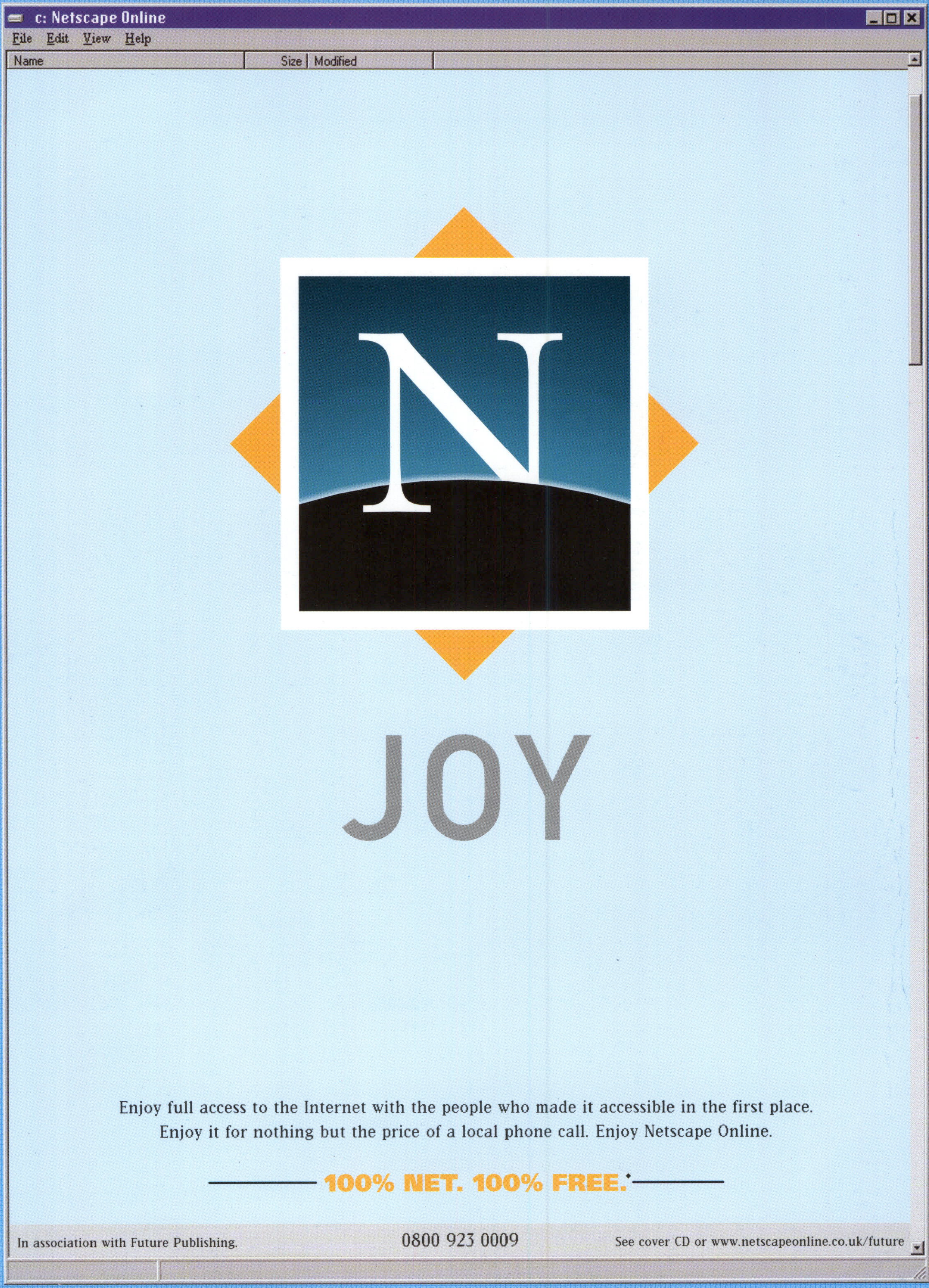

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